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MYTHS ABOUT SCIENCE

by Milton Rothman

Isaac Asimov on

THE RELATIVITY OF WRONG

Lewis Jones on

TWO CULTURES RESURRECTED

Richard A. Muller on

LUIS ALVAREZ

Richard Feynman on

FRINGE SCIENCE

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News and Comment

Live TV Special Explores, Tests Psychic Powers

Robert Steiner

ON THE NIGHT of June 7, 1989, television viewers in North America, Italy, and Australia were treated to an unusual two-hour show: "Exploring Psychic Powers—Live!" starring James Randi and featuring a host of psychic challengers bent on winning $100,000 for a successful demonstration of their alleged powers. The show also featured Randi's first appearance on the same stage with the irrepressible Uri Geller, who characteristically did not subject himself to testing. Nevertheless Randi immediately duplicated every trick Geller performed. All these ingredients resulted in an entertaining and fascinating evening, and an informative look at would-be psychics under controlled test conditions.

The show's $100,000 "psychic challenges" had been widely publicized in advance. Anyone who could demonstrate psychic ability under mutually agreed upon conditions would be awarded $100,000 on the spot. Seven challengers had been selected for a possible total of $700,000 in awards.

Randi was on the firing line. It was he, using all his knowledge and skills as skeptic, magician, and thinking human being, who defended reason over bunkum and presented the case for a questioning, skeptical attitude toward paranormal claims.

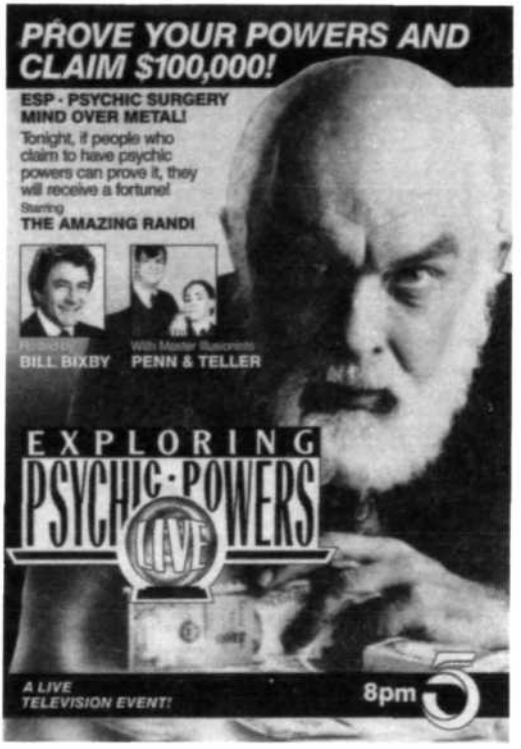
The show was produced by LBS Communications and aired on the Fox Network.

With the serious scientific, emotional, and financial issues at stake, a professional was required to emcee the proceedings. This role was admirably filled by Bill Bixby, who had played the part of a magician in a TV series of his own. Ray Hyman, a professor of psychology and a statistician, and Stanley Krippner, a parapsychology expert, supervised the technical and statistical aspects of the tests.

After the taped opening of Randi "levitating" a woman in front of Stonehenge, Randi demonstrated some of the feats Uri Geller had become famous for: He broke a spoon without any apparent physical effort on his part. Then he made the time change on a spectator's watch while it lay on the table.

For the first challenge, 12 people had been selected before the show, each with a different astrological sign. All were within three years of the same age.

Joseph Meriwether, the astrology challenger, had interviewed each of the 12 subjects, after which he named the astrological sign under which he believed each was born. On the show, each sat in a chair that clearly displayed the sign Meriwether had designated. By previous agreement, if ten of the people had been assigned to their actual signs Meriwether would have won $100,000, to say nothing



of having had his remarkable ability acclaimed worldwide.

Bixby asked any of the 12 who were *not* seated in front of their correct sign to stand up and come forward. All 12 stood up and came forward! The astrology challenger scored 0 for 12.

Barbara Martin, the aura-reading challenger, claimed to be able to read the visible colored auras that, she says, surround some people. She agreed to a test with ten subjects, each of whom she had selected as having a clearly visible aura. Several of the ten were each asked to stand, unseen by Martin, behind one of the ten large screens numbered one through ten. Martin agreed that the auras would be visible above the screens and that she would be able to tell whether or not a person was standing behind each screen.

She slowly studied the front of each screen and proclaimed that a person was standing behind each one. A show of hands revealed that someone was behind only four of them. Four out of ten correct guesses was less than the five that would be expected by chance.

Sylvia Brown, famed "psychic" from the San Francisco Bay Area, also appeared on the show, but she was not trying for a $100,000 prize. She attempted to do cold readings for members of the audience. She suggested to one woman that there was someone named "Bill" in her life. No, there was not, said the woman. Brown then tried "William." No, again. Brown then mentioned an involvement in real estate. No, once more. She then suggested a two-layered property. Yet again, the response was no. Brown then explained that "a lot of times these things can be in the future."

Brown approached another person and asked, "Who is Kathy?"

"I don't know," came the reply.

On the cover

Our cover illustration, appropriate for an issue devoted to public perceptions of science, is the logo for National Science & Technology Week, coordinated by the National Science Foundation. Through specially planned materials, programs, and events, NSTW's goal is to educate the public about science and to encourage America's future scientists and engineers. The theme of NSTW '90, April 22-28, 1990, is "Global Change: Our Common Future." For further information write NSTW, NSF, 1800 G St. N.W. Washington, DC 20550.

Undaunted, Brown continued, "She looks like she's going to be in school with you," but she got no reaction from the subject.

Brown then mentioned therapy work.

"I don't know. That doesn't sound familiar," responded the subject.

Perhaps as a diversion, Brown then inquired, "Do you know what you're going to do?"

"Yes," came the reply.

Brown responded, "Well, you don't know that yet. You're not psychic."

In conclusion, the Bay Area "psychic" said, "This is a demonstration of what psychic ability can be like."

One could hardly disagree.

Uri Geller then made his appearance, but not as a challenger. There seems to be a strong correlation between people who make a great deal of money from the "psychic" business and those who refuse to be scientifically tested by Randi.

Geller, claiming to be using his psychic power, caused the needle on a compass to move without touching it. He then showed a handful of radish seeds from a just-opened package; one appeared to sprout as he touched it.

Randi, acknowledging that he himself is a magician, moved a compass needle without touching it. He then showed a handful of newly opened seeds, and one of these also appeared to sprout.

Arthur Benjamin, a young mathematical wizard, gave a demonstration of his ability to do lightning calculations. He was able to accomplish some amazing mathematical feats even faster than an electronic calculator. These are *real* abilities—not claimed to be psychic—normal skills developed to an extraordinary degree.

The entertainers Penn and Teller gave an amusing demonstration of how New Age bunkum can convince some people of the existence of miraculous powers. The scene of their skit was a restaurant, and they were able to convince the people at the next table. Robert McCoy, curator of the Museum of Questionable Medical Devices in Minneapolis, demonstrated some bizarre machines that have been used to dupe people over the years.

The challenges resumed with Forrest Bayes, a dowser who used his divining rods over 20 numbered sealed boxes, attempting to indicate which of the boxes contained water. Bayes decided that eight of them did. In fact, only five did. When the first selected box was opened we saw that it did contain water; the second did not. Evidently because of time constraints, the show moved on at this point. Although we knew that he missed the $100,000 prize, the audience was never informed by how much or how many of his guesses were correct. This information would have been appreciated. This and several other noticeable problems resulted when the show began to run behind schedule.

Alberto Villoldo then took up the "psychic surgery" challenge. A film of his performance of this "medical procedure" was shown. Randi then gave a live demonstration of an identical procedure using a volunteer from the audience as the "patient."

Exploring What Science Is, and Isn't

SCIENCE is as much a part of our civilization's cultural and intellectual heritage as are art, music, literature, and our systems of democratic governance. It directly or indirectly affects the lives of everyone. It is both a creative activity—like poetry or painting—that calls on the muse of imagination and an analytic activity that requires the most tough-minded and clever testing of the ideas and hypotheses that emerge from that creative process. But those involved in science, as either participants or chroniclers, know the discouraging degree to which its processes are underappreciated, misunderstood, and even at times distorted.

The SKEPTICAL INQUIRER has always been concerned with the philosophical and social issues of science. It has always attempted to support the highest values of science and to promote the scientific attitude, critical thinking, and science education. This issue's theme is science and the public perceptions and misperceptions of it. In a series of articles we begin, in a small way, to explore some of these misunderstandings.

Milton Rothman presents five frequently voiced misconceptions or myths about science and nature (e.g., "Nothing is known for sure" and "Nothing is impossible") and discusses how they can lead to confusion and to paranormal beliefs. In fact, physicist Rothman points out, physics is the science of deciding what is possible and what is not possible, and some very reliable decisions can be made. Isaac Asimov explores in some detail the misimpression that scientific theories are either totally right or totally wrong rather than, as is more typically the case, gradually refined and extended and made more complete. Scientific theories are therefore not so fragile and vulnerable to wholesale overthrow as many nonscientists seem to believe. Lewis Jones reexamines the debate over the "two cultures" and recasts it to find a somewhat different dichotomy.

Then it is a special pleasure to present two short anecdotal stories by the late Richard Feynman—not included in any of his books—that show his great zest for examining and testing new ideas even if, as in these two cases, they are fairly "fringy." Just as Feynman exemplified some of the highest ideals of the scientific life, so did Luis Alvarez. Both were Nobel laureates, both had highly creative, wide-ranging scientific minds, and both, to our loss, died last year. In a personal remembrance Richard A. Muller portrays Alvarez's extraordinary scientific life, well lived, and shows what it was about this man that so touched the lives and careers of countless others. In a slight change of pace, Robert M. Price considers the metaphysics of Murphy's Law as a human need to make disorder into order.

We hope you enjoy these explorations, and we hope to have more like them in the future.

—Kendrick Frazier, EDITOR

Before the show, a number of "psychics" had been invited to make predictions. Jeane Dixon had refused to participate. The two who did failed badly. Randi aptly pointed out that, with all the wide-ranging predictions about world affairs, the "psychics" missed the really surprising events, such as the recent bloodshed in China, the death of the Ayatollah Khomeini, and the catastrophic train wreck in the Soviet Union in June.

During the program, the camera periodically shifted to ESP challenger Valerie Swan, who was being tested with Zener cards—a set of five cards, each of which shows one of five symbols: a square, a circle, wavy lines, a plus sign, or a star. Swan had telephoned me a few weeks before to thank me for referring her to the show (she had originally approached Bay Area Skeptics for testing), noted she would appear live, and concluded, "I'm going to put you guys out of business." She had been testing herself with the Zener cards over a period of months and told me she had scored consistently well above chance expectation. There is no reason to doubt her sincerity.

Prior to the show Swan had agreed that of 250 trials she would have to get 82 correct calls to win. If she did so, she would go home $100,000 richer. Her final score was exactly 50. Here, too, it would have been helpful if someone had informed the audience that her performance was just what would be expected by chance.

The show also invited at-home viewers to participate in a "National ESP Test" by guessing which of the five ESP symbols was on the card posted face-down on a display board. Of tens of thousands of calls, 16 percent guessed the square—which when it was turned over at the end of the show was shown to be the correct one. This was well under the chance expectation of 20 percent. I had told friends watching the show with me that a plurality of the callers would pick the wavy lines. And so it was: 42 percent of the callers picked the wavy lines. How did I know? When the five cards were pasted on the board for the viewers to see, the wavy-lines symbol was the middle one. It was, to my mind, an odds-on favorite to be chosen by the viewers.

Sharon McLaren-Straz was the psychometry challenger. Twelve subjects volunteered the use of both their wrist watches and their keys. The objects were mixed up, and McLaren-Straz was to match up the watches with the keys belonging to the same owner. By prior agreement, she had to match 9 out of 12 correctly to win. She succeeded in matching only two sets.

Geller reappeared on the show and told how psychic power could fix broken watches, clocks, and even appliances, for the people at home. He exhorted viewers whose broken items suddenly could work to call in. Many did.

Randi was prepared for this claim. He showed a videotape of his protégé Massimo Polidoro doing the same stunt on a recent radio program. Polidoro also had many calls from listeners reporting similar successes.

In summary, every single challenger had participated in the design of the tests and had specifically approved the protocol. Every challenger not only failed to achieve the necessary score to win the $100,000, but failed even to score significantly above chance expectations.

Randi responded to and duplicated live everything that Uri Geller did.

Congratulations are due all who put this exciting show together. Randi did a masterful job. Another show in this series is being planned for November. •

Robert Steiner is president of the Society of American Magicians, 1988-1989, and the author of the recently released Don't Get Taken! Bunco and Bunkum Exposed: How to Protect Yourself *(Wide Awake Books).*

ICR Still in Business, Still Has State Approval

William J. Bennetta

SINCE 1981, the Institute for Creation Research, a major promoter of creationist pseudoscience, has held approval by the California State Department of Education as a source of master's degrees in biology, geology, "astro/geophysics," and science education. A news report in the Summer issue of *SI* said that the department has taken steps to refuse to renew that approval, but the report did not convey how complex the ICR case really is.

In August 1988 the department sent a committee of five men to make a "qualitative review and assessment" of the ICR and its degree programs, as required by California law. Three members of the committee were academic scientists: James Woodhead, Stuart Hurlbert, and Robert Kovach. The two others had been recommended for places on the committee by Henry Morris, the ICR's president.

One of the two, George Howe, works at the Master's College, a Bible school that does not offer master's degrees in anything but religion. Howe had been linked to Morris, for many years, in the Creation Research Society and the Creation Science Legal Defense Fund, two groups devoted to fundamentalist pseudoscience. (The Defense Fund seeks to "blow evolution out of the public schools.") The other, an administrator named G. Edwin Miller, had worked at Christian Heritage College (another Bible school) when Morris was the school's president and the ICR was one of the school's divisions.

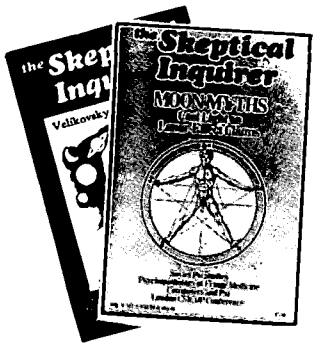
Roy Steeves, the department functionary who had chosen the committee, apparently did not tell Woodhead, Hurlbert, and Kovach about the two other men's histories or about their connections to Morris.

Although one of the ICR's degree programs was in science education and was aimed chiefly at preparing teachers, and although the law called for an assessment of "each program offered" by an institution seeking state approval, the committee had no professor of education. The ICR's science-education program simply received a free ride.

Under management by Roy Steeves, the committee produced a misleading report and recommended, "by a vote of 3 to 2," that the department's chief, Bill Honig, should renew the ICR's approval. But Woodhead and Hurlbert, who had cast the negative votes, then furnished Honig with separate accounts of what they had seen at the ICR. (Hurlbert excoriated and repudiated the committee's report, saying that he had had little influence on its content and that he did not consider himself to be an author of it.) And Kovach, after receiving supplementary information about the ICR from Honig, said that he would not have voted for approval if that information had been available at the outset. In effect, Kovach changed his vote.

In December, one of Honig's lieutenants, Joseph Barankin, notified the ICR that the department had decided to deny approval and was proposing to do so. At the same time, Honig (in statements to the press) seemed to say that approval had been definitively denied. The ICR prepared to make an appeal—a process that would start with a hearing before California's Council for Private Postsecondary Educational Institutions.

In January, however, the department abruptly drew back from its decision and started to negotiate with the ICR. The ICR was represented by Wendell Bird, the Atlanta lawyer who had led the defense of Louisiana's "creation-science"



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statute as it was ruled unconstitutional by a federal district court, a court of appeals, and (in June 1987) the U.S. Supreme Court.

The negotiations yielded an odd, vague "agreement" by which the department will examine the ICR again. The ICR says that it will revise its "science courses" and "science curriculum," conforming them to courses and curricula at accredited schools. During this effort, the ICR's "interpretations" will be removed from all courses carrying credit toward science degrees, "interpretations" will be confined to activities that will not count toward degrees. To learn whether the ICR has made the contemplated revisions, the department will dispatch a new committee of examiners. One member will be selected by the ICR; the total number of members is not specified. The ICR's science-education program evidently will receive another free ride and will not be examined.

The "agreement," which was accepted for the department by Joseph Barankin, is nonsensical on its face—as is Barankin's apparent belief that science courses at accredited schools exist as mere piles of information, unspoiled by thought or "interpretations."

Since March the department has appeared to be trying to obscure the fiasco of last August and to justify the actions of Roy Steeves. This has included stonewalling and the dissemination of inaccurate and misleading statements in the name of Bill Honig.

Meanwhile, the ICR still holds approval by the department and still is billboarding that approval in literature directed at prospective students. And the ICR still is issuing advertising that describes its "graduate school" as a school of "creationist science." This does not seem to bespeak an intention to make the radical revisions contemplated in the ICR's "agreement" with the department.

The ICR asked the department to conduct the new review and assessment during the first week in August. At this writing—June 27—I do not know whether the department has yet picked a date or has chosen any members for the new committee. I suspect, however, that the new examination will have been conducted by the time you read this. •

William J. Bennetta has analyzed the ICR case in great detail in a multiple-part article written for BASIS, *the Bay Area Skeptics' newsletter. It is available from Kent Harker, Editor,* BASIS, *P.O. Box 32451, San Jose, CA 95152. (Include $5.00 to cover costs.)*

Facts Denied, Facts Invented: Carl Baugh's World Vision

Marcus Gillespie

Earlier this year, the Students for Scientific Creationism at Texas A&M University sponsored a two-day meeting entitled "The Fallacy of the Geologic Column," featuring Carl Baugh and his assistant, a Mr. Patton. As the readers of *SI* are undoubtedly aware, these men have been working for several years to "scientifically" prove that the theory of evolution is false by showing that humans and dinosaurs once walked together at Glen Rose, Texas.

They began the meeting with a subtle attempt to bias the audience by contrasting "scientific creationism" with "humanistic evolution." As anyone familiar with the Bible Belt knows, the word *humanistic* is a buzz-word that translates as "evil" in the minds of fundamentalists, so to use this word with this audience greatly limited the possibility of any rational discourse on the topic of evolution. This was pointed out to Patton. Asked why he did not refer to evolution as "scientific evolution," he replied that evolution was not, in fact, scientific—that, at best, it was "bad science." This was the first time I had heard creationists go so far as to deny that evolutionary

theory was scientific, but during the rest of their presentation and a subsequent two-hour debate I had with Patton, they proceeded to deny various established facts and to invent a few of their own. Here are some of the claims they made:

1. Gas molecules do not experience gravitational attraction, and therefore nebulae cannot contract to form stars. According to Patton, this is because the second law of thermodynamics prevents this from happening. When I asked what force was responsible for counteracting the force of gravity, he told me this was a "stupid question," but finally conceded that he did not know.

2. There is no evidence for the existence of the Oort cloud of comets.

3. Information from the Halley fly-by missions completely invalidated all models of the nature of comets. (Hence, this proves that all models developed by astronomers of celestial objects and processes can be dismissed as irrelevant to a discussion on the age of the earth.)

4. Patton stated that geologists believe the oldest known rocks are approximately 280 million years old and that, since they are oxidized, this proves that the earth's atmosphere has always contained oxygen. (The oldest known rocks are more than 3 billion years old.) This "fact" proves that life could not have originated by natural processes because it does not now do so in the earth's present atmosphere.

5. Recent evidence has shown that Precambrian rocks (greater than 600 million years old) are actually young in age, i.e., less than 6,000 years old.

6. Magnetic banding on the ocean floor, which is indirectly used by geologists to calculate rates of continental drift, occurs only in surficial deposits and can therefore not be used in calculations of continental drift. In addition, there is no real evidence of any kind for continental drift, and any evidence that is presented in support of this process can best be explained as having resulted from catastrophic crustal deformation that occurred during the Flood.

7. The sand-dune formations exposed in the Grand Canyon stratigraphic sequence are not really lithified desert dunes, and hence do not preclude the fact that all the strata exposed there were deposited in the Flood.

8. Based on hair-sample analysis, it has been shown that woolly mammoths were actually tropical animals! In addition, "tens of thousands" of frozen mammoths have been discovered—all of which "proves" that their demise was due to a sudden catastrophic event that altered the climate. (The mechanism by which flood waters froze the mammoths was not discussed.)

9. The imperfection in anatomical form of all organisms is not due to the inability of God to better design them or to the process of evolution but, rather, to the second law of thermodynamics, which came into effect when Adam and Eve sinned and led to a deterioration from an original state of perfection.

10. Finally, Baugh claimed that he found a hammer in 400-million-year-old rock that is made of an "unknown alloy that cannot be made today." (Apparently, the people of antediluvian times were more technologically advanced than we are! I hope to contact Baugh and ask him to submit his hammer for testing in the university chemistry department.)

To those familiar with science, the claims above are clearly preposterous. Unfortunately, most of the 200 or so students who attended the meeting had little or no scientific background and accepted everything that Baugh and Patton said as "gospel." I find it distressing that scientific reality imposes no constraints whatsoever on the theorizing of fundamentalists. •

Marcus Gillespie is a doctoral student in the Department of Geography, Texas A&M University.

European UFOlogists Slam Credulity of U.S. Colleagues

BECAUSE UFOs were first "discovered" and widely publicized in the United States, and groups promoting belief in UFOs were first organized here, leaders of American UFO groups generally have been regarded as the world's leading experts on the subject.

That longstanding role is now being challenged by West European UFOlogists, who are appalled by the current preoccupation of America's two leading UFO groups—Hynek's Center for UFO Studies (CUFOS) and the Mutual UFO Network (MUFON)—with fanciful tales of UFO-abductions, the MJ-12 crashed-saucer "coverup," and the many "hokey" UFO photos taken in Gulf Breeze, Florida.

The challenge was publicly voiced in late 1988 at the First European Congress on Anomalous Aerial Phenomena by two of Italy's leading pro-UFOlogists, Edoardo Russo and Gian Paolo Grassino. Highlights of their criticism were published by CUFOS in the March/April 1989 *International UFO Reporter (IUR).* The article was titled: "UFOlogy in Europe; or, What Is America Coming To?"

Russo and Grassino pointed out that "Americans have always led the way toward a scientific ufology. . . . Even as the UFO phenomenon itself evolved, it seemed to do so within the USA. . . . In a word, America was the reference mark and a sort of ideal country for ufologists all around the world."

Until the early 1980s, U.S. and European UFOlogists followed the same path, Russo and Grassino noted. "But no longer—something has broken down. . . . Whitley Strieber's *Communion,* Budd Hopkins' alien abductors, Gary Kinder's book about Swiss contactee Billy Meier, the 'cosmic cover-up' of MJ-12, the Gulf Breeze photo-repeater case: we Europeans stand bewildered and astonished as American ufology seems to be re-entering the 1950s.

"Here are again those noisy contactees (now abductees); a new kind of George Adamski nurturing endless controversy about his wonderful yet unbelievable 'scoutship' pictures; ufologists crying 'government cover-up.'. . . Americans are debating matters for which we have no parallel here. In Europe you find no saucer crashes, few abductions (except perhaps in the U.K.), smaller government cover-ups."

In contrast, Russo and Grassino point out, European UFOlogists no longer consider Identified Flying Objects (IFOs)—UFO reports for which natural explanations are found—to be "false UFOs." They comment: "Indeed IFOs . . . are acknowledged as part of the problem whereas our overseas colleagues still regard them as little more than products for the dust-bin: identify and eliminate them."

The two Italian UFOlogists conclude: "We can no longer expect America to show us the way. . . . Indeed we in Europe, whether we realize it or not, now have our own ufology." (Similar criticism has been voiced by a leading British UFOlogist—Hilary Evans.)

The same issue of *IUR* carries a letter to the editor from Paul Devereux, a British UFOlogist, which voices similar criticism of American UFOlogists for embracing claims of UFO-abduction.

IUR editor Jerome Clark, who is also a CUFOS vice-president, responded to this criticism in the same issue in an article titled "Two Cheers for American UFOlogy." Clark criticized Russo and Grassino for "confusing contactees and abductees." According to Clark, "Whatever it is that abductees experience, it has a much greater claim to being an aspect of the UFO phenomenon than do the visionary experiences of contactees."

Clark suggested that if European UFOlogists would spend more time investigating UFO-abduction claims in-

stead of "concocting what they like to think of as psychological explanations" they would discover that none of these prosaic explanations "is adequate."

The *IUR* editor defended CUFOS's editorial support of the MJ-12 crashed-saucer issue in the following words: "Along with all the personal abuse we get for heeding the Roswell [crashed-saucer] evidence, we get only strange and unhelpful statements such as Russo and Grassino's accusation that we are so backward we 'have to resort to . . . alleged crashes which took place 40 years ago.' " Clark asks: "Could they possibly mean that because the purported events occurred 40 years ago they are not important?"

IUR's Clark concluded: "None of what I have written here should be read particularly as a brief for the extraterrestrial interpretation of UFO origin, or as an argument that a psychosocial approach to UFO inquiry is without merit." But Clark added that "only the foolhardy would, in my view, argue that they are *all* there is to the UFO phenomenon."

"From the point of view of us pragmatic Americans who are paying close attention to the evidence . . . the ETH [extraterrestrial hypothesis] seems at the moment the approach that begs the fewest questions. We are unlikely to change our minds until we hear better arguments from our critics," the CUFOS official concludes.

With people like Clark serving as spokesmen for the American UFO movement, it might be fitting if the mantle of leadership should pass to more mature and rational European UFOlogists who are wise enough to learn from the past. But, regrettably, the news media of the world still view leaders of the American UFO movement as the fountainheads of authoritative information.

—*Philip J. Klass*

American Physical Society Honors James Randi

THE AMERICAN Physical Society (APS) has given James Randi its 1989 Forum Award. The award is given for "Promoting Public Understanding of the Relation of Physics to Society."

The citation reads: "For his unique defense of science and the scientific method in many disciplines, including physics, against pseudoscience, frauds, and charlatans. His use of scientific techniques has contributed to refuting suspicious and fraudulent claims of paranormal results. He has contributed significantly to public understanding of important issues where science and society intersect."

The award was presented to Randi at the APS's 1989 Spring Meeting, May 1-4, in Baltimore, Maryland.

The APS is the leading professional organization of physicists in the United States. Its award is a significant honor, especially so since Randi is a nonscientist, and because Randi's critics—many the subjects of his relentless investigations—sometimes misguidedly attempted to discount his judgments and conclusions by saying he lacks scientific or academic credentials.

Prominent scientists have long recognized Randi's special expertise and the unique value of his contributions to science. There has also been increasing general recognition among scientists that Randi—indeed, well-prepared skeptical conjurors in general—can play a special and extremely valuable role in investigations into extraordinary claims. The award is welcome public acknowledgment of his decades of work on behalf of the scientific attitude and critical inquiry through his design of research protocols for examining controversial claims and his critical investigations, books, articles, lectures, and demonstrations.

It is the second major honor Randi has received in recent years. In 1986 he was awarded a five-year MacArthur Foundation fellowship, the only professional magician ever to be so honored. It has enabled him to continue and expand his investigations.

—*K. F.*

Monster Fun and Folklore And a Monstrous Reward

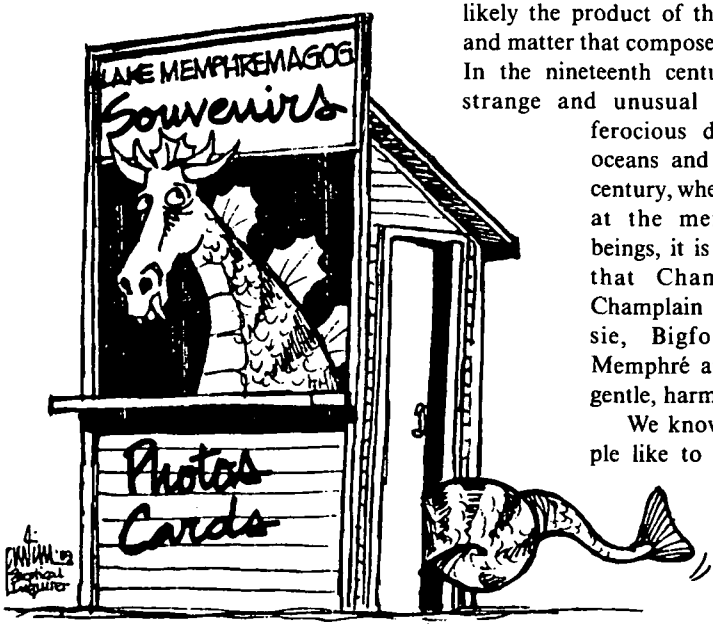
MONSTERS are a part of American folklore and, if recent polls are correct, they are becoming somewhat more popular. It is not surprising that Bigfoot, once alleged to inhabit only the Pacific Northwest, has now supposedly migrated to the Midwest and even to New England. Nor is it unexpected that additional monsters are being discovered. The most recent entry into America's list of unproved creatures is Memphré, a lake-serpent with a horse-like head. The name of the creature is derived from Lake Memphremagog in Vermont, where it has allegedly surfaced, on occasion, since 1816.

Memphré is pretty much a run-of-the-mill monster. Its description defies explanation in terms of known creatures. A local "authority" claims that sightings date back many years, and several other residents are dedicated to promoting the legend. Other common features include a small nearby town, Newport, Vermont, in need of a tourist attraction and a firm conviction on the part of believers that the animal is benign.

What is new is the offer, by the Dracontology Society of Lake Memphremagog, of a $1,000 reward for the "first authenticated, publishable photo of Memphré." The key word in the offer may be "publishable." An authentic photo of a new and sensational animal would be, by itself, both publishable and vastly more valuable than a thousand dollars. If a fuzzy or barely discernible photograph, of the type commonly taken of Bigfoot, is hoped for, it is safe to assume that the reward will probably lure one out.

The proliferation of monsters is most likely the product of that mix of mind and matter that composes human nature. In the nineteenth century and before, strange and unusual creatures were ferocious denizens of the oceans and forests. In this century, when all animals are at the mercy of human beings, it is not unexpected that Champ (the Lake Champlain monster), Nessie, Bigfoot, and now Memphré are alleged to be gentle, harmless creatures.

We know also that people like to hoax monsters.



The alleged legend of Bigfoot, if not created, has at least been enhanced by pranksters. There are many examples of the extremes individuals will go to in order to fool their neighbors. Other evidence suggests that profit-minded individuals might deliberately fake films or photos of monsters in order to sell them. It is also true that hoaxes are not always revealed; indeed, perhaps only a tiny fraction ever come to light. I would like to expand my files on people who have hoaxed monsters and on unusual pranks involving the unknown that have been uncovered. If you know of any cases of fake photos, strange tracks, or accounts by "witnesses" later recanted, write to me, c/o SKEPTICAL INQUIRER, Box 229, Buffalo, NY 14215-0229.

—*Michael Dennett*

Michael Dennett wrote "Evidence for Bigfoot? An Investigation of the Mill Creek 'Sasquatch' Prints" in our Spring 1989 issue.

Alien Food: Get Their Recipe

A NEW UFO project reported in the May 1989 *MUFON UFO Journal* is intended to counteract "skepticism and ridicule" resulting from "media accounts of alien contact [which] focus on the bizarre and spectacular." Instead, the new research effort will be on "contactee experience with alien nourishment," that is, what has been found out about what the UFOnauts eat?

Morgan Taylor, who heads the project, hopes to obtain from UFO-abductees a description of "alien nourishment . . . and any rituals or customs involved," and to learn if their food appears "similar to Earth foods."

Other questions for which Taylor hopes contactees/abductees can supply answers include:

"Did the aliens give you a recipe?"

"Did the aliens sample any Earth food and did they seem to enjoy any particular items?"

"Did you give the aliens any recipes?"

According to John Lear, son of the late Bill Lear, who developed the Learjet, ETs eat Earthlings because of a dietary deficiency that even their advanced technology cannot cure. Lear says he believes that many missing children have been devoured by ETs, who he claims operate from secret underground bases in Nevada, where he lives. If Lear is correct, this could shed new light on the disappearance of Jimmy Hoffa.

—*Philip J. Klass*

A Note from the Chairman

We are pleased to announce that Barry Karr, who has served as CSICOP's Director of Public Relations for many years, has been appointed to the position of Executive Director.

We sincerely regret that Mark Plummer has resigned as Executive Director of CSICOP and is returning to Australia. We are grateful for his years of dedicated service to CSICOP. He will continue as Chairman of the CSICOP Legal and Consumer Protection Subcommittee.

Paul Kurtz
CSICOP Chairman

1990 CSICOP Conference
Washington, D.C.

Hyatt Regency Crystal City

Critical Thinking, Public Policy, and Science Education

Friday, Saturday, and Sunday
March 30 through April 1, 1990

Friday, March 30

9:00 A.M.-12:00 NOON: **Critical Thinking**

2:00 P.M.-5:00 P.M.: (2 concurrent sessions):
I. Scientific Literacy
II. Public Policy and the Paranormal

8:00 P.M.: **Keynote Address by Gerard Piel,**
Chairman Emeritus, *Scientific American*

Saturday, March 31

9:00 A.M.-12:00 NOON: (2 concurrent sessions):
I. What is Skepticism
II. Astronomy and Pseudoscience

2:00 P.M.-5:00 P.M.: (2 concurrent sessions):
I. Animal Rights and Scientific Research
II. Physics and Psychics

7:00 P.M.: **Awards Banquet**
Richard Berendzen, President, American University
"Public Understanding of Science"

Sunday, April 1

10:00 A.M.-12:00 NOON: **Open Forum with the CSICOP Executive Council**

1:00 P.M.-4:00 P.M.: **Enhancing the Skeptics' Message**

Preregistration: $89 (meals and accommodations not included).
Registration after January 31st $99.

Programs with further details will be mailed to all SKEPTICAL INQUIRER subscribers and will appear in our Winter issue. For reservations or more information, call or write Mary Rose Hays, CSICOP Conference, Box 229, Buffalo, NY 14215-0229, 716-834-3222.

MARTIN GARDNER

Notes of a Fringe-Watcher

The Unicorn at Large

STRANGE as it may seem, radical political views, both left and right, often go hand in hand with beliefs in pseudoscience and the occult. In Philadelphia, throughout the sixties and seventies, the most prominent person to have his feet firmly planted both in the student leftist counterculture and in the rising New Age obsessions was Ira Einhorn. This is an account of how his life turned into a horror movie.*

Einhorn, or "the Unicorn," as he liked to call himself for obvious reasons, was born in Philadelphia in 1940 to working-class Jewish parents. When he graduated from the University of Pennsylvania with a degree in English, he was a large, muscular, slightly pudgy young man with pink cheeks, fierce blue eyes, a scruffy beard, and long dark hair that he often wore tied in a pony tail. He frequently broke into high-pitched giggling. During the sixties he was friendly with Abbie Hoffman, Jerry Rubin, Allen Ginsberg, Alan Watts, Baba Ram Dass, and other counterculture heroes. He experimented with LSD. He was an active environmentalist. Bright, charismatic, gregarious, the Unicorn was a walking symbol of love, gentleness, compassion, and peace.

In 1964, Einhorn taught English for a year at Temple University, in Philadelphia, but his teaching style was too unconventional and the post was not renewed. In 1967 he sponsored the city's first Be-In. While emceeing the city's Earth Day in 1970, which he also organized, he startled U.S. Senator Ed Muskie, in front of television cameras, by kissing him on the mouth.

In 1971, Ira ran for mayor in the Philadelphia Democratic primary on the Planetary Transformation ticket and got 965 votes. Philadelphia newspapers loved him and covered his many lectures, calling him the city's "counterculture mayor," its "local guru," and its "oldest hippie."

For years Einhorn ran an international information network of some 350 members, to whom he sent batches of material on psychic research and related topics. The network was funded, incredibly, by the Bell Telephone Company under a barter arrangement. Bell printed and mailed the releases, and Ira in turn helped Ma Bell handle the hippie community. At Penn's "Free University," he lectured on the virtues of psychedelic drugs.

In 1974, Doubleday Anchor published Einhorn's only book, *78-187880.* The title was the book's Library of Congress number. It is a wild work, filled with drivel about how the world will soon be transformed by New Age thinking. The book, bought and edited by Einhorn's good friend Bill Whitehead, was one of

* My account is based on Philadelphia newspaper clips, on Steven Levy's remarkably detailed book *The Unicorn's Secret: Murder in the Age of Aquarius* (Prentice Hall, 1988), and on a lengthy informative front-page article, "Blinded by the Light—the Einhorn-Maddux Murder Case," in the *Village Voice* (July 23, 1979).

Doubleday's biggest commercial flops. Whitehead moved to Dutton, where he was conned by Einhorn into publishing a variety of worthless New Age books of which *Space-Time and Beyond* (1975), by Fred Wolfe, Bob Toben, and Jack Sarfatti, was the worst.

Of the many books about Israel's psychic charlatan Uri Geller, surely the most demented was Andrija Puharich's *Uri,* published in 1974 by Doubleday Anchor at Ira's insistence. (See my review in *Science: Good, Bad and Bogus.*) Einhorn and Puharich were buddies, both persuaded that Uri's spoon-bending powers would revolutionize physics. "Ira Einhorn's imagination helped to formulate this book," Puharich wrote on the acknowledgment page, "and to get it to the attention of publishers." Ira had earlier written the introduction to Puharich's *Beyond Telepathy* (Doubleday Anchor, 1962).

Here is how Ira evaluated Puharich's crazy book on Geller. I quote from Ira's "Uri and the Power of UFOs," in Arthur Rosenblum's oversized paperback *Unpopular Science* (Philadelphia: Running Press, 1974):

> Having spent much time with Uri Geller, and having seen him produce evidence again and again that his powers are genuine, I can only say that it behooves us to accept his explanation for his powers. He is a medium for an extraterrestrial civilization that has been monitoring earth for thousands of years. *Uri,* by Andrija Puharich, is the story of the development of those powers, and will be utterly convincing to anyone who is capable of reading with an open heart. I lived with Andrija while he was writing the book and was in constant dialogue with him about Uri's powers during that time. Still, the book blew my mind. . . . My editor at Doubleday, who is a close friend, and the agent who is working with the book, were so overwhelmed by *Uri* that they wondered if I would be connected with a fraud.

Ira Einhorn, as he appeared in 1971.

From Einhorn's other articles I singled out "A Disturbing Critique," which ran in *CoEvolution Quarterly* (Winter 1977/78). Its theme: Russia has found a way to build Nikola Tesla's "magnifying transmitter." This device is said to use extremely low frequency (ELF) waves to transmit electrical power without wires. It can disrupt our radio communications, addle our brains, trigger weather disasters, cause massive power blackouts, transmit horrible diseases, and even translocate ships. By the late seventies, among some extreme right-wing groups, Tesla had become a cult figure. The Tesla Book Company (POB 1649, Greenville, TX 75401) still issues catalogs listing dozens of books and tapes extolling Tesla and warning of Soviet advances in psychotronic warfare. Research on Tesla's secrets was one of Puharich's obsessions. He currently sells wrist watches made to combat the deadly ELF radiation beamed to us by the evil Soviets.

In January 1977, Einhorn organized a "Mind Over Matter" conference at Penn, at which Puharich was a principal

speaker. In the keynote address of a "Towards a Physics of Consciousness" symposium at the Harvard Science Center (May 6-8, 1977), which he coordinated, Ira spoke about how far Russia was ahead of us in psi-warfare research. Our nation can be saved, he argued, only by a great spiritual awakening based on parapsychology, Eastern religions, and a "more accurate model of the universe."

Beneath Einhorn's flower-child exterior flowed dark undercurrents of narcissism, monstrous egotism, priapism, and sexual rage. "He wore women like jewelry," a friend commented. Although Ira demanded unlimited sexual freedom for himself, he was insanely jealous of similar freedom on the part of any girlfriend of the moment. In 1962 he came close to strangling a young Bennington student. "To kill what you love," he wrote in a notebook, "when you can't have it seems to me so natural that strangling ——— last night seemed so right. . . . Insanity, thank goodness, is only temporary."

In 1966, he almost killed a Penn undergraduate by bashing her head with a Coke bottle. Later he wrote a poem about it. Titled "An Act of Violence," it contained these lines:

> Suddenly it happens.
> Bottle in hand, I strike
> Away at the head.
> In such violence there may
> be freedom.

Ira fancied himself a talented poet, but like all his other poems, this is on the lowest level of free-verse doggerel.

Helen Maddux, or Holly, as she was called, grew up in the East Texas town of Tyler, the daughter of a wealthy draftsman. She was blond, blue-eyed, beautiful, shy, frail, fey, and diabetic. A graduate of Bryn Mawr, with a degree in English, Holly was 25 when she and Ira met and fell in love. For five years they lived together, interrupted only by Holly's leaving for brief periods, desperately seeking her own "space," always to return. It was during their trip to Europe in 1977 that she decided to dump the Unicorn for good. Holly came home alone, settled on Fire Island, in New York, and began dating another man.

On September 11 or 12, 1977, Holly vanished. After a year of missed letters and phone calls, her parents hired a private investigator. Ira's pad was then a second-floor-rear apartment at 3411 Race Street, in the Powelton Village section of west Philly, near the Penn campus. It was the hippie center of the city, a "commune with traffic lights," someone called it. Ira slept on the floor surrounded by hundreds of books. First-floor residents told the detective about a foul odor that seemed to descend from Ira's screened-in back porch. The terrible smell lessened in the winter, returned in the spring.

On March 28, 1979, a homicide detective and six other men arrived with a search warrant. Ira said he had lost the key to a big padlock on the door to a back-porch closet. The hasp was snapped with a crowbar. In the closet was a black steamer trunk. Again Ira said he had no key. The trunk was pried open with the crowbar. Inside, wrapped in plastic, was stuffed a decomposed, mummified body. It had been drained of blood, packed with styrofoam chips, and covered with newspapers whose dates matched the time of Holly's disappearance. The front and sides of the skull were fractured at a dozen places.

"It looks like Holly's body," said the detective.

"You found what you found," said Ira.

The Unicorn was released on $40,000 bail. A trivial cash bond of $4,000 was paid by Barbara Bronfman, wife of Charles Bronfman of Montreal, a Seagram liquor heir. Barbara was and is a true believer in the paranormal, and to this day a loyal admirer of the Unicorn. Arlen Specter, a former Philadelphia

1/19/80
16 C
MORGAN HOUSE
7600 STENTON AV.
PHILA PA 19118

DEAR MARTIN GARDNER,

MARTIN EBON MENTIONED TO ME THAT YOU HAD INQUIRED ABOUT MY CASE. THUS, I AM HAVING SENT TO YOU, UNDER SEPARATE COVER, A PACKAGE I SENT OUT AS A FUND RAISING EFFORT. PLEASE IGNORE THE FUND RAISING LETTER + READ MY LAWYER'S LETTER + THE F.B.I. REPORT.

WE HAVE NOW RECEIVED THEIR FINAL SAY, IN ANOTHER REPORT THAT TOTALLY DESTROYS THE CASE AGAINST ME.

THEIR IS NO BLOOD OR HUMAN PROTEIN TO BE FOUND ANYWHERE

THERE ARE NO BREAKDOWN PRODUCTS OF BLOOD OR HUMAN PROTEIN.

THE F.B.I. COULD NOT EVEN IDENTIFY AS SIMILAR THE SUBSTANCE FOUND IN THE TRUNK + SUBSTANCES FOUND ON THE FLOORBOARDS IN MY BACK CLOSET.

WHOEVER DID IT BOTCHED THE JOB, FOR NO JURY (IF IT GETS THAT FAR) WOULD BELIEVE I CARRIED THE BODY BACK INTO MY APARTMENT AFTER DRAINING IT OF BLOOD.

AN EXCERPT FROM A RECENT POEM DESCRIBES MY PRESENT CONSTERNATION:

IRA EINHORN - SUSPECT;

HELEN HOLLY MADDUX - VICTIM;
MURDER

IS MY KOAN
OF THE MOMENT

We have a body
without Blood

IN A TRUNK
WITHOUT BLOOD
OR HUMAN PROTEIN

DRIPPING SMELLY
OOZE
THAT IS NOT BLOOD
OR
HUMAN PROTEIN

CENTRAL CASTING
IN THIS CAPER
WHICH HAS PUT MY LIFE
AT STAKE
'READS' LIKE STANISLAW LEM

PEACE,

Ira Einhorn
215-242-2261

Einhorn's letter, written while free on bail, to Martin Gardner.

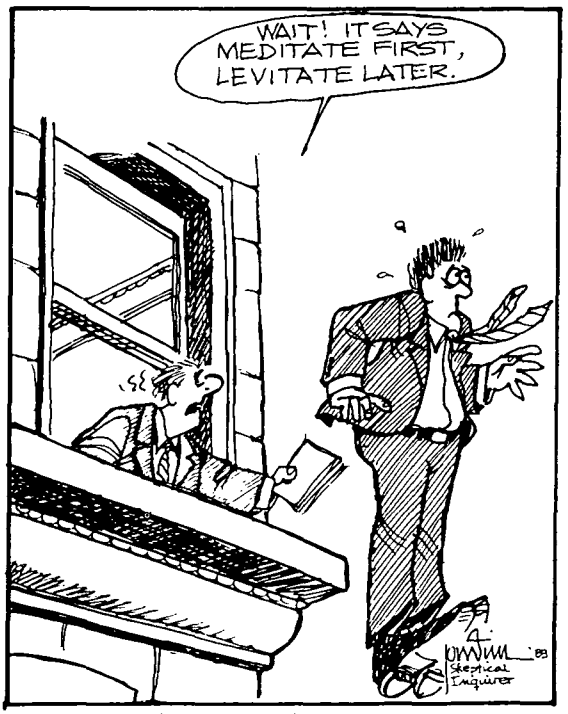
D.A. (now a Republican senator), was Ira's lawyer. Einhorn steadfastly maintained he had been framed. By whom? Maybe the KGB, he said. Why? To discredit his knowledge of Russia's secret warfare devices based on Tesla's notebooks. Sensitive documents relating to these secrets, Ira insisted, had been locked in the trunk but were now missing.

During the 18 months that the body mouldered in the trunk, Ira behaved as though nothing had happened. He told his friends and Holly's parents that he did not know where Holly was. He loved her deeply, he said, and longed to have her back. He ran a "Sun Day" in Philadelphia. After a bout of deep depression, in which he contemplated suicide, he began taking a dangerous drug called Ketamine. In 1978 he received $6,000 as a visiting fellow at the John F. Kennedy School of Government, at Harvard, where he taught a seminar titled "The Hierarchy Is Surrounded." In 1979, he attended a conference in England, and was the guest of the Yugoslavian government to arrange a celebration for Tesla.

On January 13, 1981, the day before his scheduled pre-trial hearing, Ira turned out to be in Europe. He was last seen in 1986, living near Trinity College, in Dublin, where he was studying German under the name of Ben Moore. His present whereabouts is unknown. "He betrayed everything I stood for," Jerry Rubin told a reporter.

While Ira was home on bail, he was visited by Martin Ebon, an occult journalist then writing a book on psi warfare. Ebon told Einhorn that I was interested in his case. To my surprise, the Unicorn sent me a two-page letter, handprinted in blue ink. It is reproduced on page 19.

I know that one should not publish a private letter without the sender's permission, but I doubt if the Unicorn will complain. •



WHY SO MANY LEVITATION EXPERIMENTS END IN FAILURE

The first CSICOP conference in Latin America

Mexico City

Friday and Saturday

November 10 and 11, 1989

Sponsored by the

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"Magical Thinking and Its Prevalence in the World Today"

Simultaneous Spanish-English interpretation will be provided.

Friday, Nov. 10: School of Psychology, Univ. of Mexico, Mexico City

8:00 P.M.: **Keynote Address by Mario Bunge,** professor of philosophy at McGill University, Montreal (formerly of the University of Buenos Aires)

Saturday, Nov. 11: Holiday Inn Crowne Plaza Hotel, 80 Reforma Drive, Columbus Circle, downtown Mexico City

9:00 A.M.-5:00 P.M.

Speakers (partial list)

Paul Kurtz, CSICOP Chairman, professor of philosophy at the State University of New York at Buffalo

Mario Mendez-Acosta, Chairman, Mexican Association for Skeptical Research

James ("The Amazing") Randi

James Alcock, professor of psychology at York University, Toronto

Kendrick Frazier, Editor of the SKEPTICAL INQUIRER

Joe Nickell, author, investigator of the "unexplained"

Serasin Mercado, professor of psychology, University of Mexico

Victor Vasquez, professor of psychology, University of Mexico

7:00 P.M.: **Banquet** ($30.00 per person, by reservation only)

Registration fee: $60 for admission to all sessions (meals and accommodations not included).

For registration form and accommodations information, write or call:

Barry Karr
CSICOP
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Tele.: 716-834-3222

Mario Mendez-Acosta
Apartado Postal 19-546
Mexico City, Mexico 03900 DF
Tele.: 011-52-5-651-6504

ROBERT SHEAFFER

Psychic Vibrations

AFTER YEARS of putting up with UFO abductions, UFO assaults, and a government coverup of the same, they're as mad as hell and they're not going to take it anymore! Aviator John Allen Lear of Las Vegas, head of the Nevada section of the Mutual UFO Network (MUFON), the largest UFO group in the United States, and Milton W. Cooper of Fullerton, California, issued an "indictment" of the U.S. government for its alleged collusion with cold-blooded space aliens who are wantonly violating the rights of earthlings (see this column, *SI,* Fall 1988:33).

The two charged that "the government has approved and entered into a secret treaty with an Alien Nation against the terms of the Constitution and without the advise [*sic*] and consent of the Congress or the people." While the government has already "given this Alien Nation land and bases within the borders of these United States," it was proclaimed that "in the taking of human lives, property and livestock of the citizens of these United States and in the commission of numerous other abominable and barbarous acts, this Alien Nation has proven to be the mortal enemy of the people, the nation, and all of humanity. Abductions, surgical operations, implantations, biological sampling, impregnations, psychological damage, and other horrors have been and are being performed upon humans by this Alien Nation. For these reasons a state of war now exists and has existed between the people of the United States and this Alien Nation." In this, their own version of a Declaration of Independence, Lear and Cooper called on the U.S. government to 'fess up about this sordid treaty by April 30, 1989, and to order the aliens off this planet by June 1. Since no such thing has happened, you may safely assume that the saucer aliens continue their abductions, implantations, and impregnations of earthlings as usual.

Those who find themselves unsettled by this admittedly shocking state of affairs may wish to take advantage of a $10-million UFO Abduction Insurance policy offered with tongue firmly in cheek by the UFO Abduction Insurance Company in Altamonte Springs, Florida. The Smithsonian's *Air and Space* magazine reports that for a mere $7.95 the benefits

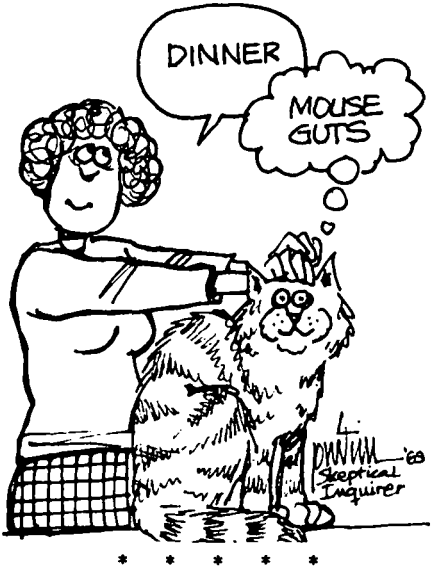
include outpatient psychiatric care, sarcasm protection, and most reassuring of all, a $20-million double-indemnity clause should the aliens practice unsafe sex, or consider the abductee as a nutritional food source. However, before you collect anything, proof of abduction must be provided. Mike St. Lawrence, the entrepreneur behind this promising venture, says that if anyone wishes to collect on this policy, they'll have to be patient: "We'll spread it out. Say, one dollar a year for ten million years."

* * * * *

If some animal in your life—a dog, a cat, a horse, or even an ant—is not behaving the way you think it should, perhaps it is because animals these days "don't get no respect." That's the message taught by self-proclaimed "animal psychic" Penelope Smith, who lives along California's rugged seacoast north of San Francisco. She claims, reports the *San Mateo Times,* that a person can learn to talk to any animal, including rodents, insects, and slugs, provided that one regards them "as fellow spiritual beings—they're like us, in different bodies. I don't just talk . . . but listen. Getting their thoughts, images, emotions."

One perplexed horse owner called Smith to see why the animal had been acting so contrary in recent months. Smith requested that the owner place the horse on the telephone. After her psychic consultation, Smith reported: "The horse was feeling there was no place to relate to. I kind of laid it on the line and told her, 'If you want a good life as a horse, you're going to have to cooperate.' This horse is now totally different. I talked to her [today], and she said she's thought about it and she was on the wrong track."

This technique of psychic rapport potentially extends all the way down the animal kingdom. A local artist asked what to do about the ants that had recently been invading her home. She had already tried talking to the ants, but so far had seen no results. Smith told the artist that what she needed to do was to speak directly to "the lead ant." (How to identify the queen's above-ground representative was not specified.) She should let it know that it is bothersome to have ants underfoot and ask it straight out what it wants. The artist replied that the ants have already "told" her they are thirsty, so she has set out some water for them outdoors. If this technique works, it won't be long before sore throats are healed by having a frank discussion with the germs that cause them. The Peninsula Humane Society, which sponsored Penelope Smith's talk, reports that she is the most popular speaker the organization has ever had.



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It is often said that "prayer changes things," but can it literally transmutate elements? Indeed it can, according to the members of two California prayer groups. They say that their rosaries have started to glow, or have changed from silver to gold or copper. The *San Francisco Chronicle* reports allegations of "miraculous" changes in rosary metal starting in April of last year. Mary Senour

says that she saw her rosary change from silver to gold as she was driving home from a prayer retreat. Linda Somers reports that the clear crystal beads in her rosary began glowing. At least 18 different people have reported changes in their rosaries.

Apparently this sort of thing started happening after a series of alleged miracles in Medjugorje, Yugoslavia, began to get worldwide publicity. Two years ago, 50 people in Portsmouth, Rhode Island, reported changes in their rosaries after returning home from a pilgrimage to Medjugorje. Evan Hacker, a jeweler in Mill Valley, California, examined one of these miraculous rosaries and said: "The one we inspected is made out of brass and white base metal, and under certain conditions base metals will oxidize and corrode. It's an oxidation process better known as tarnishing." But the Reverend John McGregor, who leads one of the prayer groups, disagrees. "I don't really think it's a chemical reaction from their sweaty hands or their houses or the air in Medjugorje. I think the phenomenon is much like Moses and the burning bush. It calls people's attention to prayer." •

RESEARCH ON ANCIENT TECHNIQUES FOR REDUCING AUTOMOBILE INSURANCE PREMIUMS.

Myths About Science . . . And Belief in the Paranormal

Proper use of physical principles can help judge the plausibility of paranormal claims. People often respond to such reasoning with arguments that reveal some basic misconceptions about science and nature.

Milton Rothman

INVESTIGATIONS of paranormal phenomena are most often carried out on a case-by-case basis. Investigators go into the field to determine what people actually saw when they say they saw a UFO. The statistics and methods of parapsychology researchers are examined to make sure that no errors were made. Faith healers are carefully observed to see if anybody is actually cured. The prime rule is: Find out what actually happened and expose what tricks, if any, were used to produce the observed effects. And we are urged to avoid a priori judgments and to keep our minds open to the possibility of the occurrence of any kind of an event.

And yet some of us with training in science feel that another approach is legitimate. We should be able to apply to paranormal claims the same methods of deduction that we use in evaluating ordinary physical phenomena. Proper use of previously validated physical principles should enable us to make educated judgments concerning the plausibility of some of the claims to which we are exposed. After all, one of the things we learn in physics is how to decide between the kinds of actions that may happen in nature and those that are not allowed to happen. These decisions are governed by the fundamental principles of physics. The best-known application of these principles to the world of pseudoscience is the use of conservation of energy to deny the possibility of a "perpetual motion" device. A small literature exists describing how physics and mathematics may be used to judge

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the validity of all manner of paradoxical claims (De Morgan [1872] 1915; Ord-Hume 1977; Gardner [1953] 1957; Rothman 1989, 1988).

Invariably, whenever I attempt to explain how knowledge of the laws of physics supports skepticism about reports of UFOs, ESP, astrology, and other such matters, I receive a number of standard responses. These responses demonstrate that much thinking about science has some of the characteristics attributed to mythology. In this article, I would like to show that much of what passes for logical argumentation consists of the repetition of certain clichés that are believed to be true by large numbers of people. These statements are believed to be true because strong psychological forces maintain their presence in human folklore: People want to believe them, and belief in the validity of these ideas provides emotional payoff. Nevertheless, these beliefs have little or no validation in reality. It is for this reason that I call them myths. (The term *myth* is here used in the sense of "any fictitious story, or unscientific account, theory, belief, etc." [*Webster's New World Dictionary* 1988].)

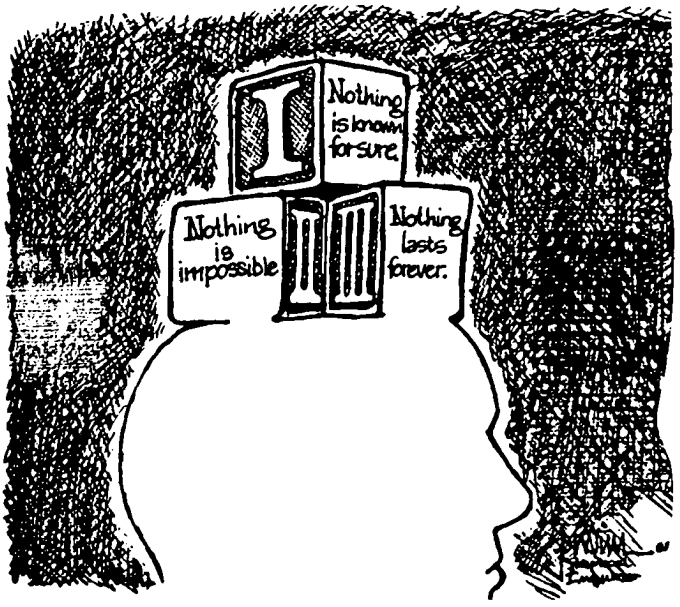
1. *Nothing is known for sure.* This statement represents philosophical skepticism. In addition, the idea that "nothing is known for a certainty" plays a useful political role in the arguments of those espousing one or more paranormal phenomena. If nothing is known for sure, then any one of our present laws of nature may be overturned in the future and replaced by a contrary law. If nothing is known for sure, then it is impossible for scientists to say that a given phenomenon is forbidden by nature. If nothing is known for sure, then future advanced civilizations may be able to do all kinds of amazing things that we now consider impossible. Thus the belief that nothing is known for sure is a prior condition for believing in the other myths to follow.

Of course, if we restate the myth as "It is impossible to say that anything is impossible," it becomes transparently clear that a paradox is being perpetrated. Therefore the statement is probably false, a priori.

The philosophical position of skepticism comes down to us from antiquity. It is related to Platonism, which teaches that true reality consists of the thoughts within the mind. It follows that ideas concerning the world outside of our minds are simply constructs manufactured from the raw materials of our individual thoughts. In this kind of universe it is impossible to be certain of anything, not even of our own existence.

Significantly, the growth of modern science has accompanied a move away from Platonism and its replacement by the concept that there does exist a real world outside our bodies and that we all learn about that real world by interpreting signals entering our brains through the channels of our sensory organs. In the realistic philosophy of modern neuroscience there is no separate "mind" but only the workings of the physical nervous system. All of contemporary science is based on a denial of mind-body dualism.

The fundamental premise of modern science is that there is no doubt concerning my existence and your existence. If we accept the existence of a real universe, then we have made a start toward real knowledge: Either



we know *something* for sure or we know nothing at all.

Bertrand Russell clarified this dilemma when he wrote: "Although every part of what we should like to consider 'knowledge' may be in *some* degree doubtful, it is clear that some things are almost certain, while others are matters of hazardous conjecture. For a rational man, there is a scale of doubtfulness, from simple logical and arithmetic propositions and perceptive judgments, at one end, to such questions as what language the Mycenaeans spoke . . . at the other" (Russell 1948).

Scientists occasionally err on the side of caution in judging the certainty of their knowledge. In so doing, they feed the myth that "nothing is known for sure." Jacob Bronowski fell into this trap when he said: "There is no absolute knowledge. And those who claim it, whether they are scientists or dogmatists, open the door to tragedy. All information is imperfect. We have to treat it with humility" (Bronowski 1973:375).

This statement must be understood in its context. Bronowski was speaking of the Heisenberg uncertainty principle: that all physical measurements have a certain degree of error, no matter how carefully the measurement is performed. He was comparing the pragmatic methods of scientists with the dogmatic pseudoscientific theories of the Nazis, whose coming to power in Germany coincided with the development of the uncertainty principle in quantum theory.

And yet, in spite of the undeniable need for care and humility, physicists have learned a great deal during the past century. As a result we can point to some areas of knowledge that possess such a high degree of certainty that it would be folly to deny their validity. A few examples demonstrate the point:

(*a*) One plus one equals two. In mathematics this is simply the definition of addition in the domain of real numbers, and within this context it is

absolute knowledge. You are free to make other definitions, but then you have a different kind of mathematics (e.g., vector addition). This apparently trivial example demonstrates the importance of definitions in science. While a definition itself may be perfectly and mathematically precise, its application to the physical world depends on the existence and properties of the real objects to which the definition refers. One orange plus one orange always equals two oranges. However, in physics one kilogram plus one kilogram does not always equal two kilograms.

(*b*) Another example of the interdependence of definitions and physical reality: all electrons repel each other because (1) they all have negative electric charges and (2) like charges always repel each other. You might say: "How do you know that somewhere in nature there are not a few electrons with positive charges? If they were few enough they might have been overlooked." The answer is that there do, in fact, exist particles that are just like electrons in every respect, but whch have positive charges. But these are called *positrons* rather than electrons. By definition, all electrons have negative charges. Thus, a combination of verbal definition and experiments that demonstrate the existence of these particles gives us knowledge that is quite absolute. There is no uncertainty about the sign of the electron charge because it is a discrete property; the Heisenberg uncertainty does not apply to it.

(*c*) The earth is not flat. That is, its surface is not a plane surface. This is a negative statement and is qualitative in nature, so its validity does not depend on measurements of the exact shape of the earth. Therefore this statement represents a totally certain piece of knowledge. Similarly, we assert that the earth is not the center of the universe. While at one time saying this may have landed you in the middle of a bonfire, we have, as a result of physical observation, reached the point where this idea is accepted as absolute knowledge.

The statements above do not depend on measurements of absolute precision. Other statements in science do depend on precise measurements, and in those cases we must, indeed, recognize that no measurement is made with complete accuracy. What is not generally appreciated is how very precisely many measurements can be made in physics. The particle model of modern physics has been verified by an interlocking set of measurements whose errors amount to less than one part out of one thousand million. The law of conservation of energy—very important in the evaluation of pseudoscientific and paranormal claims—has been verified by nuclear physics experiments with a precision of one part out of a thousand million million (10^{15}). To get some concept of what this precision means, imagine that you are able to type at the rate of 100 words a minute and that you make only one error out of a thousand million million. This means you can go for 30 million years without making a mistake. This kind of precision can be considered "perfect" for all practical purposes.

What all this means is that the particle model and the law of conservation of energy are pieces of knowledge that possess an extremely high degree of certainty. They are not "just theories." They are part of knowledge. And

though they may not be "absolute knowledge" they represent knowledge so well founded that extremely good counter-evidence would be required to jeopardize our confidence in them.

The person who prefaces all arguments with the statement that "we don't know anything for sure" is exhibiting an extreme form of skepticism. His doubt is directed against scientists who claim that psychics cannot foretell the future or that UFOs cannot remain suspended above the earth with no visible means of support. Because the believer in the paranormal wants to believe that nature does allow such phenomena, he often wraps himself in the cloak of an excessively rigorous skepticism directed against scientific knowledge. This form of skepticism is dogmatic skepticism that ignores the empirical knowledge acquired by scientists during the past century.

The scientist, on the other hand, is a pragmatic skeptic. He believes in the importance of looking at physical evidence, and he believes that there is now enough evidence to cast doubt on most paranormal claims, using scientific deduction from validated physical principles. He is willing to change his ideas if sufficient and proper evidence is provided; but when claims are made that require abandonment of the particle model of modern physics or the law of conservation of energy, then he wants to see very strong evidence before he changes his mind.

Understanding the difference between dogmatic skepticism and pragmatic skepticism is of great importance in applying the principles of science to analysis of pseudoscience and the paranormal.

2. *Nothing is impossible.* If we start with the premise that nothing is known for sure, then it becomes impossible for anyone to say that a proposed action is impossible, for it requires knowledge to make judgments concerning matters of fact. However, if we agree that at least some of our knowledge is certain, or at least verified to a high degree of certainty, then we are in a position to say that some events are not permitted by nature. This is because nature possesses a specific structure characterized by a number of physical symmetries, discovered during the past century, that govern the behavior of all the particles that comprise matter (Rothman 1985). Because of these symmetries, certain actions are allowed to take place in nature and certain other actions are not allowed to take place.

An important symmetry principle (time symmetry) is related to the law of conservation of energy, which—as mentioned earlier—has been verified to an extraordinarily high degree of precision. It is this law that allows us to say with confidence that it is impossible to build a device (a perpetual-motion machine) whose operation creates energy out of nothing. It must be emphasized that modern physics gives new meaning to the idea of proving that perpetual-motion machines cannot work. In the past, the method of logical induction required that every possible kind of machine be tested in order to be sure that none of them would work. This would require an indefinite number of tests. Even then you could never be sure, for at any time a different kind of process might come along to allow the creation of energy from nothing. But modern physics finds only four different kinds

of energy existing in nature (corresponding to the four forces of particle physics). Thus conservation of energy has only to be tested by showing that in any reaction among any of a relatively small number of particles, interacting by only four kinds of forces, no energy is created or destroyed. Since everything is made of such particles, it follows that conservation of energy is true for all processes in nature. (Under myth No. 4, I will give reasons for thinking that the present four energies are sufficient.)

Conservation of energy applies to more than perpetual-motion machines. It also throws doubt on claims of ESP, precognition, dowsing, and other mainstays of parapsychology. Belief in parapsychology is generally associated with a belief in mind-body dualism—the idea that the mind is separate from the body and of a nonphysical nature so that information can enter the mind by some nonphysical means. However, modern neuroscience treats "mind" as something that emerges from the operation of the physical brain. Nowhere do scientists find evidence of psychic energy, spirit, soul, *elan vital,* or other necessities of mysticism. Therefore all neuroscience starts with a physical model, whose basis is that a number of electrons and ions must be set into motion within the nervous system in order to originate a thought within the brain. Setting electrons and ions into motion requires energy, and this energy must come from somewhere.

When we analyze the situation in detail, we realize that no physical force exists in nature capable of transmitting organized energy (information) from one brain to another without the use of the normal sensory organs. Such a force would have to be capable of working over long distances and be strong enough to move electrons and ions about. The electromagnetic force is the only force in nature with the right properties, but we know that the amount of electromagnetic radiation emitted from the brain is far too small to have the claimed effects. (And radiation from the brain could not explain either direct perception at a distance or precognition.) This evidence makes us highly suspicious of any kind of subjective experience claimed to result from external information stimulating thoughts without passing through the conventional sensory channels.

When one tries to explain why the laws of nature do not allow certain things to happen, enthusiasts of pseudosciences invariably fall back on the argument that "anything is possible." But physics is the science of deciding what is possible and what is not possible, and we now know sufficient physics to make some very reliable decisions.

However, in applying the principles of physics to paranormal phenomena, one must operate with care. It is often difficult or impossible to predict what is going to happen in a given situation, or even to explain what did happen. Our best computers have a hard time predicting next week's weather. On the other hand, the laws of physics are quite precise in telling us what kind of things *cannot* happen. Therefore I am on perfectly safe ground when I predict that none of my readers is suddenly going to levitate to the ceiling—no matter what kind of cult he or she may belong to. To make predictions of this sort I rely on what I call "laws of denial"—laws of nature that tell

us what is not allowed to happen (Rothman 1988). Conservation of energy and momentum are prime examples of such laws of denial. The principle of relativity, which states that no matter, energy, or information can travel faster than the speed of light, is another law of denial. A judicious use of these laws enables us to judge a wide variety of proposals to be impossible with a very high degree of confidence.

"Anything is possible"—or its equivalent, "Nothing is impossible"—thus turns out to be a myth, useful for argumentation, exhortation, and inspiration. It is expressive of wishful thinking, but based on no foundation of fact.

3. *Whatever we think we know now is likely to be overthrown in the future.* If we allow that "nothing is known for sure," then all our knowledge has a fluid basis. Nothing has a solid foundation or core. Indeed, there is a pseudo-democratic hint from some quarters that all theories are equal because they are merely matters of opinion, which ignores the empirical basis of scientific theory. This attitude leads to the possibility that whatever we think we know now will be shown to be false and replaced by a new theory in the future. It is true that many past theories have been replaced by newer theories: The earth-centered solar system was replaced by the sun-centered model; caloric theory was replaced by kinetic theory; ether was replaced by electromagnetic theory; and so on. The resulting feeling of impermanence is often exploited by believers in the paranormal when they say: "Our theories of the mind will change in the future to allow for ESP," or "Relativity will be replaced by a new theory that will allow us to travel faster than light," or "Evolution will be replaced by creationism."

Those who wish to be perceived as knowledgeable sometimes make reference to the work of Thomas Kuhn (1962), who orginated the concept of *paradigm change.* A paradigm is a model of reality whose acceptance by the scientific community is determined by social influences as well as by empirical data. The history of science is a history of changes in paradigms: from Newtonian physics to relativity, from classical mechanics to quantum mechanics. It then becomes tempting to think of *all* paradigms as subject to change: all theories may be overthrown in the future and replaced by others.

But nowhere in his book does Kuhn say that all paradigms are subject to change. In the past, some false theories have been replaced by correct theories: replacement of the earth-centered solar system by the sun-centered system, for example. The new paradigm is a correct one and will not change in the future. In general, the evolution of theories is from the less correct to the more correct, as instrumentation and experimental methods improve. Often the new paradigm includes the old one as a limiting case. Niels Bohr called this inclusiveness the "correspondence principle," as he showed that quantum physics gives the same results as Newtonian physics when the masses of the objects involved are sufficiently large.

Indeed, since any scientific theory must be based on empirical evidence, it follows that if theory A is able to explain some observations but not others, then when it is replaced by theory B, theory B must explain the same

observations as theory A, plus all the others. The new theory must be more inclusive and explain more of the facts than the old theory.

The history of science is much too complex to treat simply as a succession of one theory after another. There are many theories that have not changed since their inception. For example, the concept of energy as a quantitative measure of changes going on in a system has never required a fundamental change, although it has been necessary to add new forms of energy as they have been discovered (and subtract some found unnecessary). The concept that the amount of energy in a closed system never changes has often been challenged, but has never been falsified.

For these reasons I believe it is perpetrating a myth to say that "whatever we think we know now is likely to be overthrown in the future." This is merely a debating device used by those who do not want to admit that physics includes some knowledge of a permanent nature.

4. *Advanced civilizations of the future will have the use of forces unknown to us at present.* When I say that telepathy and other forms of ESP cannot work because there is no force in nature capable of transmitting information directly into the human mind without the intervention of the normal sensory organs, one possible response is that there are forces in nature that we know nothing of but which will be discovered in the future. Similarly, if I say that there are no forces in nature capable of propelling a space vehicle from the earth to Alpha Centauri with a travel time of less than a hundred years, a possible response is that advanced civilizations of the future will have the use of forces we cannot conceive of now.

I think the concept of new and unknown forces is a myth, for several reasons. First, forces do not arise from nothing; nor can human beings generate forces at will. Humans never really "control" nature in the deepest sense of the word. All humans can do is to arrange objects so that when these objects do what they have to do as required by the forces of nature, then the result agrees with our desires. There are four of these natural forces:

	Long-Range	**Short-Range**
Strong	Electromagnetic	Strong nuclear
Weak	Gravitational	Weak nuclear

The two short-range forces operate only at distances of less than the diameter of an atomic nucleus. The strong nuclear force is the most powerful force and is responsible for holding the nuclear particles together. The weak nuclear force is only 10^{-13} as strong and plays a role in the decay of radioactive particles. Because of the short range of these forces they play no role in large-scale affairs, such as setting macroscopic objects into motion and sending messages through space.

The long-range forces operate over large distances (following the inverse-square law), but the gravitational force is so weak that it requires the mass of planets and stars to give effects noticeable without the use of ultrasensitive

instruments. It is the electromagnetic force that is responsible for everything that happens on a human level: It holds solids together; it organizes atoms into molecules; it enables us to send pictures through space by electromagnetic waves; it is responsible for all of chemistry and biology.

What of other possible forces? There is no denying the possibility of other forces existing in nature, and physicists are constantly looking for them. For the past several years we have heard many reports of a new kind of gravitational force that either is repulsive in nature or varies with distance differently than the ordinary gravitational force. But this force is exceedingly weak—so weak that all the experiments to date give contradictory results, making one wonder whether this is another chimerical quest. A force that weak is of no use to us for practical purposes. What we need is a force that is both strong and long-range.

And that leads us to the crucial question: Where is there room in nature for another force that is both strong and long-range? My argument is that if such a force existed it would already have been observed. Remember, forces do not arise out of nothing. They exist as interactions between fundamental particles. But the four known forces are sufficient to explain the behavior of all the fundamental particles that make up normal matter. To get another force you would need a new class of particles. I will not deny the possibility of creating new types of particles in accelerators at exceedingly high energies, but under ordinary conditions—what physicists call "room conditions"—the standard model of particle physics suffices, and in that model the four known forces are considered sufficient to explain all we see.

Since the human brain consists of ordinary matter, there is no possibility of explaining the phenomena claimed by parapsychology with the aid of new and unknown forces. As for the possibility of creating extraordinary matter capable of generating extraordinary strong and long-range forces for propulsion of interstellar vehicles, even the extraordinary energy generators of quasars and black holes emit no detectable radiation outside the description of the standard model. If unexpected forms of matter or energy do exist, they apparently do not interact with standard matter and so are useless for practical purposes.

5. *Advanced civilizations on other planets will possess great forces unavailable to us on Earth.* The UFO as portrayed by modern mythology is a saucer-shaped object that hangs high in the air unsupported by any visible means. There are no forces known in nature that can hold such a large mass motionless high in the air. Some UFO enthusiasts claim the trick is done by magnetic fields. However, we know a great deal about magnetic fields, and such a feat of levitation cannot be performed by such means. A magnet needs another magnet to push against in order to levitate (and fields strong enough to do the job would be detectable all over the country). Rockets won't supply sufficient force for more than a few minutes. What else is left? The answer always given at this point is: *Advanced civilizations on other planets possess great forces unknown to us on Earth.*

The response to such a statement is essentially the same as that given for myth No. 4. There are only four different forces in existence, and of these only the electromagnetic force has the range and strength to do useful work for humans. And this force is unable to hold a massive vehicle suspended in midair without a visible light and sound show. There is no reason to believe that planets orbiting distant stars have other kinds of forces, because when we analyze the light coming from those distant stars we find that all the stars contain the same kinds of matter and the same kinds of energy as our own solar system. Things are not different in other parts of the universe. In fact, this statement of uniformity is the central premise of modern cosmology. If the entire universe started from one big bang and spread out from that initial mass, then matter everywhere must be the same, for it all comes from the same source. There is no way for other parts of the universe to be made of different kinds of matter with properties radically different from our own.

Epilogue

Myths are rarely countered by facts. Once born, they carry on independent lives. But it is necessary to be aware of them if we are to maintain a realistic view of the universe. Knowledge of the laws of physics—especially the conservation laws—helps us make decisions about the borderline between myth and fact, between fantasy and reality.

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The Relativity of Wrong

People think that scientific theories that aren't perfectly and completely right are totally and equally wrong. In fact, good concepts are gradually refined and extended. Supplanted theories are not so much wrong as incomplete.

Isaac Asimov

I RECEIVED a letter the other day. It was handwritten in crabbed penmanship so that it was very difficult to read. Nevertheless, I tried to make it out just in case it might prove to be important.

In the first sentence, the writer told me he was majoring in English literature, but felt he needed to teach me science. (I sighed a bit, for I knew very few English Lit majors who are equipped to teach me science, but I am very aware of the vast state of my ignorance and I am prepared to learn as much as I can from anyone, so I read on.)

It seemed that in one of my innumerable essays, I had expressed a certain gladness at living in a century in which we finally got the basis of the universe straight.

I didn't go into detail in the matter, but what I meant was that we now know the basic rules governing the universe, together with the gravitational interrelationships of its gross components, as shown in the theory of relativity worked out between 1905 and 1916. We also know the basic rules governing the subatomic particles and their interrelationships, since these are very neatly described by the quantum theory worked out between 1900 and 1930. What's more, we have found that the galaxies and clusters of galaxies are the basic units of the physical universe, as discovered between 1920 and 1930.

These are all twentieth-century discoveries, you see.

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The young specialist in English Lit, having quoted me, went on to lecture me severely on the fact that in *every* century people have thought they understood the universe at last, and in *every* century they were proved to be wrong. It follows that the one thing we can say about our modern "knowledge" is that it is *wrong*.

The young man then quoted with approval what Socrates had said on learning that the Delphic oracle had proclaimed him the wisest man in Greece. "If I am the wisest man," said Socrates, "it is because I alone know that I know nothing." The implication was that I was very foolish because I was under the impression I knew a great deal.

Alas, none of this was new to me. (There is very little that is new to me; I wish my correspondents would realize this.) This particular thesis was addressed to me a quarter of a century ago by John Campbell, who specialized in irritating me. He also told me that all theories are proved wrong in time.

My answer to him was, "John, when people thought the earth was flat, they were wrong. When people thought the earth was spherical, they were wrong. But if *you* think that thinking the earth is spherical is *just as wrong* as thinking the earth is flat, then your view is wronger than both of them put together."

The basic trouble, you see, is that people think that "right" and "wrong" are absolute; that everything that isn't perfectly and completely right is totally and equally wrong.

However, I don't think that's so. It seems to me that right and wrong are fuzzy concepts, and I will devote this essay to an explanation of why I think so.

First, let me dispose of Socrates, because I am sick and tired of this pretense that knowing you know nothing is a mark of wisdom.

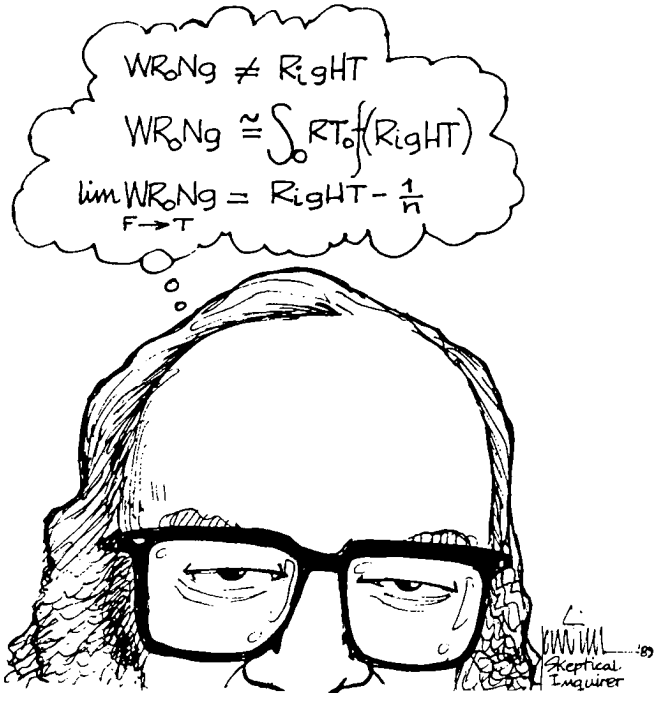
No one knows *nothing*. In a matter of days, babies learn to recognize their mothers.

Socrates would agree, of course, and explain that knowledge of trivia is not what he means. He means that in the great abstractions over which human beings debate, one should start without preconceived, unexamined notions, and that he alone knew this. (What an enormously arrogant claim!)

In his discussions of such matters as "What is justice?" or "What is virtue?" he took the attitude that he knew nothing and had to be instructed by others. (This is called "Socratic irony," for Socrates knew very well that he knew a great deal more than the poor souls he was picking on.) By pretending ignorance, Socrates lured others into propounding their views on such abstractions. Socrates then, by a series of ignorant-sounding questions, forced the others into such a mélange of self-contradictions that they would finally break down and admit they didn't know what they were talking about.

It is the mark of the marvelous toleration of the Athenians that they let this continue for decades and that it wasn't till Socrates turned 70 that they broke down and forced him to drink poison.

Now where do we get the notion that "right" and "wrong" are absolutes? It seems to me that this arises in the early grades, when children who know



very little are taught by teachers who know very little more.

Young children learn spelling and arithmetic, for instance, and here we tumble into apparent absolutes.

How do you spell sugar? Answer: s-u-g-a-r. That is *right.* Anything else is *wrong.*

How much is 2 + 2? The answer is 4. That is *right.* Anything else is *wrong.*

Having exact answers, and having absolute rights and wrongs, minimizes the necessity of thinking, and that pleases both students and teachers. For that reason, students and teachers alike prefer short-answer tests to essay tests; multiple-choice over blank short-answer tests; and true-false tests over multiple choice.

But short-answer tests are, to my way of thinking, useless as a measure of the student's understanding of a subject. They are merely a test of the efficiency of his ability to memorize.

You can see what I mean as soon as you admit that right and wrong are relative.

How do you spell "sugar"? Suppose Alice spells it p-q-z-z-f and Genevieve spells it s-h-u-g-e-r. Both are wrong, but is there any doubt that Alice is wronger than Genevieve? For that matter, I think it is possible to argue that Genevieve's spelling is superior to the "right" one.

Or suppose you spell "sugar" s-u-c-r-o-s-e, or $C_{12}H_{22}O_{11}$. Strictly speaking, you are wrong each time, but you're displaying a certain knowledge of the subject beyond conventional spelling.

Suppose then the test question was: How many different ways can you

spell "sugar"? Justify each.

Naturally, the students would have to do a lot of thinking and, in the end, exhibit how much or how little they know. The teacher would also have to do a lot of thinking in the attempt to evaluate how much or how little the student knows. Both, I imagine, would be outraged.

Again, how much is 2 + 2? Suppose Joseph says: 2 + 2 = purple, while Maxwell says: 2 + 2 = 17. Both are wrong, but isn't it fair to say that Joseph is wronger than Maxwell?

Suppose you said: 2 + 2 = an integer. You'd be right, wouldn't you? Or suppose you said: 2 + 2 = an even integer. You'd be rather righter. Or suppose you said: 2 + 2 = 3.999. Wouldn't you be *nearly* right?

If the teacher wants 4 for an answer and won't distinguish between the various wrongs, doesn't that set an unnecessary limit to understanding?

Suppose the question is, How much is 9 + 5? and you answer 2. Will you not be excoriated and held up to ridicule, and will you not be told that 9 + 5 = 14?

If you were then told that 9 hours had passed since midnight and it was therefore 9 o'clock, and were asked what time it would be in 5 more hours, and you answered 14 o'clock on the grounds that 9 + 5 = 14, would you not be excoriated again, and told that it would be 2 o'clock? Apparently, in that case, 9 + 5 = 2 after all.

Or again, suppose Richard says: 2 + 2 = 11, and before the teacher can send him home with a note to his mother, he adds, "To the base 3, of course." He'd be right.

Here's another example. The teacher asks: "Who is the fortieth president of the United States?" and Barbara says, "There isn't any, teacher."

"Wrong!" says the teacher, "Ronald Reagan is the fortieth president of the United States."

"Not at all," says Barbara. "I have here a list of all the men who have served as president of the United States, under the Constitution, from George Washington to Ronald Reagan, and there are only thirty-nine of them, so there is no fortieth president."

"Ah," says the teacher, "but Grover Cleveland served two nonconsecutive terms, one from 1885 to 1889, and the second from 1893 to 1897. He counts as both the twenty-second and twenty-fourth president. That is why Ronald Reagan is the thirty-ninth person to serve as president of the United States, and is, at the same time, the fortieth president of the United States."

Isn't that ridiculous? Why should a person be counted twice if his terms are nonconsecutive, and only once if he served two consecutive terms. Pure convention! Yet Barbara is marked wrong—just as wrong as if she had said the fortieth president of the United States was Fidel Castro.

Therefore, when my friend the English literature expert tells me that in every century scientists think they have worked out the universe and are *always wrong,* what I want to know is *how* wrong are they? Are they always wrong to the same degree? Let's take an example.

In the early days of civilization, the general feeling was that the earth

was flat. This was not because people were stupid, or because they were intent on believing silly things. They felt it was flat on the basis of sound evidence. It was *not* just a matter of "That's how it looks," because the earth does *not* look flat. It looks chaotically bumpy, with hills, valleys, ravines, cliffs, and so on.

Of course there are plains where, over limited areas, the earth's surface *does* look fairly flat. One of those plains is in the Tigris-Euphrates area, where the first historical civilization (one with writing) developed, that of the Sumerians.

Perhaps it was the appearance of the plain that persuaded the clever Sumerians to accept the generalization that the earth was flat; that if you somehow evened out all the elevations and depressions, you would be left with flatness. Contributing to the notion may have been the fact that stretches of water (ponds and lakes) looked pretty flat on quiet days.

Another way of looking at it is to ask what is the "curvature" of the earth's surface. Over a considerable length, how much does the surface deviate (on the average) from perfect flatness. The flat-earth theory would make it seem that the surface doesn't deviate from flatness at all, that its curvature is 0 to the mile.

Nowadays, of course, we are taught that the flat-earth theory is *wrong;* that it is all wrong, terribly wrong, absolutely. But it isn't. The curvature of the earth is *nearly* 0 per mile, so that although the flat-earth theory is wrong, it happens to be *nearly* right. That's why the theory lasted so long.

There were reasons, to be sure, to find the flat-earth theory unsatisfactory and, about 350 B.C., the Greek philosopher Aristotle summarized them. First, certain stars disappeared beyond the Southern Hemisphere as one traveled north, and beyond the Northern Hemisphere as one traveled south. Second, the earth's shadow on the moon during a lunar eclipse was always the arc of a circle. Third, here on the earth itself, ships disappeared beyond the horizon hull-first in whatever direction they were traveling.

All three observations could not be reasonably explained if the earth's surface were flat, but could be explained by assuming the earth to be a sphere.

What's more, Aristotle believed that all solid matter tended to move toward a common center, and if solid matter did this, it would end up as a sphere. A given volume of matter is, on the average, closer to a common center if it is a sphere than if it is any other shape whatever.

About a century after Aristotle, the Greek philosopher Eratosthenes noted that the sun cast a shadow of different lengths at different latitudes (all the shadows would be the same length if the earth's surface were flat). From the difference in shadow length, he calculated the size of the earthly sphere and it turned out to be 25,000 miles in circumference.

The curvature of such a sphere is about 0.000126 per mile, a quantity very close to 0 per mile, as you can see, and one not easily measured by the techniques at the disposal of the ancients. The tiny difference between 0 and 0.000126 accounts for the fact that it took so long to pass from the

flat earth to the spherical earth.

Mind you, even a tiny difference, such as that between 0 and 0.000126, can be extremely important. That difference mounts up. The earth cannot be mapped over large areas with any accuracy at all if the difference isn't taken into account and if the earth isn't considered a sphere rather than a flat surface. Long ocean voyages can't be undertaken with any reasonable way of locating one's own position in the ocean unless the earth is considered spherical rather than flat.

Furthermore, the flat earth presupposes the possibility of an infinite earth, or of the existence of an "end" to the surface. The spherical earth, however, postulates an earth that is both endless and yet finite, and it is the latter postulate that is consistent with all later findings.

So, although the flat-earth theory is only slightly wrong and is a credit to its inventors, all things considered, it is wrong enough to be discarded in favor of the spherical-earth theory.

And yet is the earth a sphere?

No, it is *not* a sphere; not in the strict mathematical sense. A sphere has certain mathematical properties—for instance, all diameters (that is, all straight lines that pass from one point on its surface, through the center, to another point on its surface) have the same length.

That, however, is not true of the earth. Various diameters of the earth differ in length.

What gave people the notion the earth wasn't a true sphere? To begin with, the sun and the moon have outlines that are perfect circles within the limits of measurement in the early days of the telescope. This is consistent with the supposition that the sun and the moon are perfectly spherical in shape.

However, when Jupiter and Saturn were observed by the first telescopic observers, it became quickly apparent that the outlines of those planets were not circles, but distinct eclipses. That mean that Jupiter and Saturn were not true spheres.

Isaac Newton, toward the end of the seventeenth century, showed that a massive body would form a sphere under the pull of gravitational forces (exactly as Aristotle had argued), but only if it were not rotating. If it were rotating, a centrifugal effect would be set up that would lift the body's substance against gravity, and this effect would be greater the closer to the equator you progressed. The effect would also be greater the more rapidly a spherical object rotated, and Jupiter and Saturn rotated very rapidly indeed.

The earth rotated much more slowly than Jupiter or Saturn so the effect should be smaller, but it should still be there. Actual measurements of the curvature of the earth were carried out in the eighteenth century, and Newton was proved correct.

The earth has an equatorial bulge, in other words. It is flattened at the poles. It is an "oblate spheroid" rather than a sphere. This means that the various diameters of the earth differ in length. The longest diameters are any of those that stretch from one point on the equator to an opposite point

on the equator. This "equatorial diameter" is 12,755 kilometers (7,927 miles). The shortest diameter is from the North Pole to the South Pole and this "polar diameter" is 12,711 kilometers (7,900 miles).

The difference between the longest and shortest diameters is 44 kilometers (27 miles), and that means that the "oblateness" of the earth (its departure from true sphericity) is $^{44}/_{12755}$, or 0.0034. This amounts to $^{1}/_{3}$ of 1 percent.

To put it another way, on a flat surface, curvature is 0 per mile everywhere. On the earth's spherical surface, curvature is 0.000126 per mile everywhere (or 8 inches per mile). On the earth's oblate spheroidical surface, the curvature varies from 7.973 inches to the mile to 8.027 inches to the mile.

The correction in going from spherical to oblate spheroidal is much smaller than going from flat to spherical. Therefore, although the notion of the earth as a sphere is wrong, strictly speaking, it is not as wrong as the notion of the earth as flat.

Even the oblate-spheroidal notion of the earth is wrong, strictly speaking. In 1958, when the satellite Vanguard 1 was put into orbit about the earth, it was able to measure the local gravitational pull of the earth—and therefore its shape—with unprecedented precision. It turned out that the equatorial bulge south of the equator was slightly bulgier than the bulge north of the equator, and that the South Pole sea level was slightly nearer the center of the earth than the North Pole sea level was.

There seemed no other way of describing this than by saying the earth was pear-shaped, and at once many people decided that the earth was nothing like a sphere but was shaped like a Bartlett pear dangling in space. Actually, the pearlike deviation from oblate-spheroid perfect was a matter of yards rather than miles, and the adjustment of curvature was in the millionths of an inch per mile.

In short, my English Lit friend, living in a mental world of absolute rights and wrongs, may be imagining that because all theories are *wrong,* the earth may be thought spherical now, but cubical next century, and a hollow icosahedron the next, and a doughnut shape the one after.

What actually happens is that once scientists get hold of a good concept they gradually refine and extend it with greater and greater subtlety as their instruments of measurement improve. Theories are not so much wrong as incomplete.

This can be pointed out in many cases other than just the shape of the earth. Even when a new theory seems to represent a revolution, it usually arises out of small refinements. If something more than a small refinement were needed, then the old theory would never have endured.

Copernicus switched from an earth-centered planetary system to a sun-centered one. In doing so, he switched from something that was obvious to something that was apparently ridiculous. However, it was a matter of finding better ways of calculating the motion of the planets in the sky, and eventually the geocentric theory was just left behind. It was precisely because the old theory gave results that were fairly good by the measurement standards of the time that kept it in being so long.

Again, it is because the geological formations of the earth change *so* slowly and the living things upon it evolve *so* slowly that it seemed reasonable at first to suppose that there was *no* change and that the earth and life always existed as they do today. If that were so, it would make no difference whether the earth and life were billions of years old or thousands. Thousands were easier to grasp.

But when careful observation showed that the earth and life were changing at a rate that was very tiny but *not* zero, then it became clear that the earth and life had to be very old. Modern geology came into being, and so did the notion of biological evolution.

If the rate of change were more rapid, geology and evolution would have reached their modern state in ancient times. It is only because the difference between the rate of change in a static universe and the rate of change in an evolutionary one is that between zero and very nearly zero that the creationists can continue propagating their folly.

Again, how about the two great theories of the twentieth century: relativity and quantum mechanics?

Newton's theories of motion and gravitation were very close to right, and they would have been absolutely right if only the speed of light were infinite. However, the speed of light is finite, and that had to be taken into account in Einstein's relativistic equations, which were an extension and refinement of Newton's equations.

You might say that the difference between infinite and finite is itself infinite. so why didn't Newton's equations fall to the ground at once? Let's put it another way and ask how long it takes light to travel over a distance of a meter.

If light traveled at infinite speed, it would take light 0 seconds to travel a meter. At the speed at which light actually travels, however, it takes it 0.0000000033 seconds. It is that difference between 0 and 0.0000000033 that Einstein corrected for.

Conceptually, the correction was as important as the correction of the earth's curvature from 0 to 8 inches a mile was. Speeding subatomic particles wouldn't behave the way they do without the correction, nor would particle accelerators work the way they do, nor nuclear bombs explode, nor the stars shine. Nevertheless, it was a tiny correction and it is no wonder that Newton, in his time, could not allow for it, since he was limited in his observations to speeds and distances over which the correction was insignificant.

Again, where the prequantum view of physics fell short was that it didn't allow for the "graininess" of the universe. All forms of energy had been thought to be continuous and to be capable of division into indefinitely smaller and smaller quantities.

This turned out to be not so. Energy comes in quanta, the size of which is dependent upon something called Planck's constant. If Planck's constant were equal to 0 erg-seconds, then energy would be continuous, and there would be no grain to the universe. Planck's constant, however, is equal to 0.00000000000000000000000000066 erg-seconds. That is indeed a tiny deviation

from zero, so tiny that ordinary questions of energy in everyday life need not concern themselves with it. When, however, you deal with subatomic particles, the graininess is sufficiently large, in comparison, to make it impossible to deal with them without taking quantum considerations into account.

Since the refinements in theory grow smaller and smaller, even quite ancient theories must have been sufficiently right to allow advances to be made; advances that were not wiped out by subsequent refinements.

The Greeks introduced the notion of latitude and longitude, for instance, and made reasonable maps of the Mediterranean basin even without taking sphericity into account, and we still use latitude and longitude today.

The Sumerians were probably the first to establish the principle that planetary movements in the sky exhibit regularity and can be predicted, and they proceeded to work out ways of doing so even though they assumed the earth to be the center of the universe. Their measurements have been enormously refined but the principle remains.

Newton's theory of gravitation, while incomplete over vast distances and enormous speeds, is perfectly suitable for the solar system. Halley's Comet appears as punctually as Newton's theory of gravitation and laws of motion predict. All of rocketry is based on Newton, and Voyager II reached Uranus within a second of the predicted time. None of these things were outlawed by relativity.

In the nineteenth century, before quantum theory was dreamed of, the laws of thermodynamics were established, including the conservation of energy as first law, and the inevitable increase of entropy as the second law. Certain other conservation laws, such as those of momentum, angular momentum, and electric charge, were also established. So were Maxwell's laws of electromagnetism. All remained firmly entrenched even after quantum theory came in.

Naturally, the theories we now have might be considered wrong in the simplistic sense of my English Lit correspondent, but in a much truer and subtler sense, they need only be considered incomplete.

For instance, quantum theory has produced something called "quantum weirdness," which brings into serious question the very nature of reality and which produces philosophical conundrums that physicists simply can't seem to agree upon. It may be that we have reached a point where the human brain can no longer grasp matters, or it may be that quantum theory is incomplete and that once it is properly extended, all the "weirdness" will disappear.

Again, quantum theory and relativity seem to be independent of each other, so that while quantum theory makes it seem possible that three of the four known interactions can be combined into one mathematical system, gravitation—the realm of relativity—as yet seems intransigent.

If quantum theory and relativity can be combined, a true, "unified field theory" may become possible.

If all this is done, however, it would be a still finer refinement that would

affect the edges of the known—the nature of the big bang and the creation of the universe, the properties at the center of black holes, some subtle points about the evolution of galaxies and supernovas, and so on.

Virtually all that we know today, however, would remain untouched and, when I say I am glad that I live in a century when the universe is essentially understood, I think I am justified. •

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	12:00 P.M.–2:00 P.M.:	Lunch Break
	2:00 P.M.:–5:00 P.M.:	Workshop
	7:30 P.M.:	Banquet ($30, optional)
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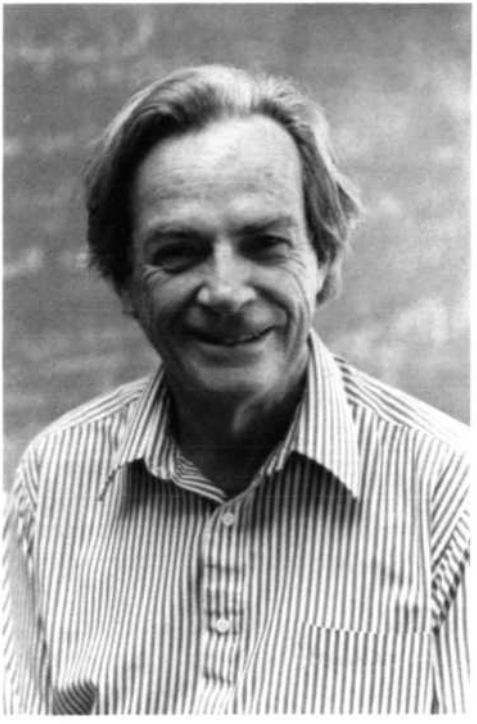
Richard Feynman on Fringe Science



Caltech photo by Robert Paz

Long before he became a beloved public figure through his two best-selling books Surely You're Joking, Mr. Feynman *and* What Do You Care What Others Think? *and his highly visible service on the space shuttle Challenger commission, Richard Feynman was a legendary figure in science, respected and even revered by his colleagues and former students. All appreciated much the same things about him: his penetrating mind, his deep sense of curiosity and wonder about everything, his candor and informality, his irreverence and wit, his distaste for bureaucracy, and his contagious enthusiasm and natural gift for communicating the joy of physics to students and laymen alike. Recipient of the Nobel Prize in Physics in 1965, he spent the bulk of his career at Caltech.*

The following two stories by Feynman, who died February 15, 1988, did not appear in either of his two popular books, but they are in the same delightful anecdotal style. We are grateful to his longtime friend and literary collaborator, Ralph Leighton, for making them available for publication in SI *and to Al Seckel of the Southern California Skeptics for first drawing them to our attention. They were first published in the SCS newsletter* Laser *(January-April 1989), and we are pleased to bring them to a wider audience.*

—Kendrick Frazier, EDITOR

Mr. Papf's Perpetual-Motion Machine

Richard P. Feynman

ONE TIME [in 1966] some students came over to my house with one of those magazines about automobiles—*Roadrunner,* or something like that. In it there was an article about a marvelous new engine that works on a new principle for getting power, and it's really quite remarkable. You don't have to buy fuel for the car; the fuel is injected into the cylinders when the engine is manufactured and lasts for about six months. Then you have to bring it back to have it recharged. The engine is air-cooled and can make a car run 60 miles per hour on the freeway.

There was a picture of the engine and its inventor, Mr. Joseph Papf, who had come to the United States from Hungary. He's standing next to the engine, making measurements on it with a panel full of dials. Various people had looked at the engine and made various remarks about it in the article.

Mr. Papf was going to demonstrate his engine in Los Angeles, and the students wanted me to go along with them to see it. I told them nothing has enough power to go for six months like that, unless it's a nuclear reactor, which it surely is not. "Fakes are always coming out," I said, "and the guy's probably trying to get investors to invest in his engine."

Then I told them some stories about perpetual-motion machines, such as the one in a London museum that was in a glass case. It had no wires connected to it, yet it turned around and around. "You have to ask yourself, 'Where is the power supply?' " I said. In that case, it was some air coming up through a little tube installed in one of the wooden legs holding up the glass case.

The students talked me into going along with them to see the demonstration. It was held in a refrigerator company's parking lot, an L-shaped area. The engine was down at one end of the lot, while the people, about 30 or so, were at the bend of the L, some distance away. Mr. Papf talked about how the motor worked, using vague and complicated phrases about radiation, atoms, different levels of energy, quanta, and this and that, all of which made no sense whatsoever, and would never work.

But the rest of what he said was important, for every fraud has to have the right characteristics: Mr. Papf explained that he had tried to sell his engine to the big automobile companies, but they wouldn't buy it because they were afraid it would put all the big oil companies out of business. So there was obviously a conspiracy working against Mr. Papf's marvelous new engine. Then there was a reference to the magazine articles, and an

announcement that in a few days the engine was going to be sent to the Stanford Research Institute for validation. This proved, of course, that the engine was real. There was also an invitation to prospective investors to get in on this great opportunity to make large amounts of money, because it was very powerful. And there was a certain danger!

There were quite a few wires running from the engine down to where Mr. Papf and the spectators were standing and into a set of instruments used for measurement; these included a variac, a variable transformer with a dial that could put out different voltages. The instruments were, in turn, connected by a cord to an electrical outlet in the side of the building. So it was pretty obvious where the power supply was.

The engine started to go around, and there was a bit of disappointment: the propeller of the fan went around quietly without the noise of an ordinary engine with powerful explosions in the cylinders, and everything—it looked very much like an electric motor.

Mr. Papf pulled the plug from the wall, and the fan propeller continued to turn. "You see, this cord has nothing to do with the engine; it's only supplying power to the instruments," he said.

Well, that was easy. He's got a storage battery inside the engine. "Do you mind if I hold the plug?" I asked.

"Not at all," replied Mr. Papf, and he handed it to me.

It wasn't very long before he asked me to give him back the plug. "I'd like to hold it a little longer," I said, figuring that if I stalled around enough, the damn thing would stop.

Pretty soon Mr. Papf was frantic, so I gave him back the plug and he plugged it back into the wall.

A few moments later there was a big explosion: A cone of silvery uniform stuff shot out and turned to smoke. The ruined engine fell over on its side.

The man standing next to me said, "I've been hit!"

I looked at him, the whole side of his arm was torn open, you could see all the muscle fibers, tendons—everything. I helped him over to a chair to sit down.

The youngest student in the group knew what to do. "Make a tourniquet out of a tie for that man!" he told me. He gave orders to everybody, and began to give artificial respiration to another man who was lying on the ground. It was really quite wonderful to see this young student take over with all those grown men around.

By the time the paramedics came, we realized that there were three men injured, the one lying on the ground most seriously: He had a hole in his chest (so the artificial respiration wasn't effective) and he ultimately died. The other two men survived. We were all shaking.

I turned to the young man who had been so capable in coping with the unexpected tragedy. "I don't usually drink," I said, "but let's go over to a bar and have a drink to calm our nerves."

We went into a bar and ordered a drink. I was surprised to discover that the young man who had been the most mature of all was underage—

he couldn't get a drink.

We started to talk about the engine. One man, an investor who had brought an engineer with him to see the demonstration, said, "My engineer advised me to stand mainly behind the corner of the building and just peer out during the demonstration, because these new engines are sometimes 'dangerous.' "

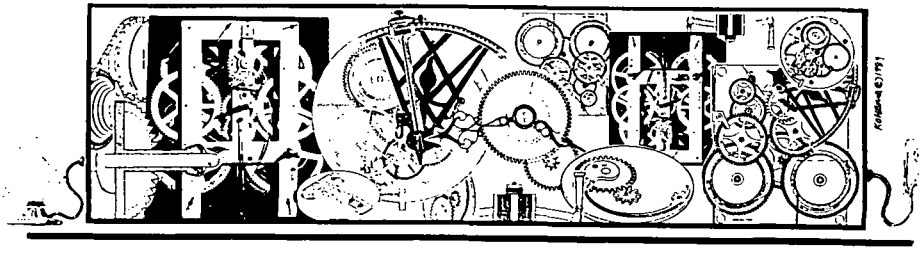
Somebody else pointed out that Mr. Papf had previously done some work with rockets, and the explosion looked like rocket fuel when it goes off.

My idea was that had Mr. Papf sent his engine to the Stanford Research Institute as announced, the game would have been up in a few days. Therefore an explosion just big enough to destroy the engine would keep the game going a little longer; it would show the tremendous power of the engine, and, most important, it would provide a reason for investors to put more money into the project, now that the engine had to be rebuilt. We all agreed that the explosion was much larger than Mr. Papf probably intended.

After such an explosion with the resulting fatality and injuries, there was, of course, a lawsuit. Mr. Papf sued *me* for ruining his engine, charging that my stalling around with the cord caused him to lose control of it. Caltech has a legal department to protect its errant professors, so they talked to me. I told them I thought he didn't have much of a case: He would have to prove how the engine worked, and he'd have to demonstrate that, in fact, taking the cord off *caused* the explosion.

The case was settled out of court, and Mr. Papf was paid something. I guess there's a certain amount of wisdom in not going to court, even when you're right, but I cost Caltech a certain amount of money by going to that demonstration. I still think I correctly diagnosed what was happening with a reasonable probability.

And, of course, nothing has been heard of Mr. Papf's new engine since. •



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A Visit with Uri Geller

Richard P. Feynman

WHILE I was out at Malibu [in 1975] using [John] Lilly's tanks,* all sorts of people came through who were connected with the "mystical" world. One man began talking about Uri Geller, who was supposed to be able to bend keys through some kind of supernatural forces, and could bend a wire inside of a tube, et cetera. This man told me that Geller had convinced some people in England—for example, physicist David Bohm—of his supernatural powers. He thought I should like to investigate this, and would I be interested?

I of course said yes, indeed, I would be interested. I told him, "I think the laws of physics are supposed to describe all phenomena, and I don't see how Geller can do those things, according to the laws I know. So if it's demonstrable, then it means I don't know all there is to know in the directions that I *think* I know, and therefore it would be interesting to me." Of course I've lived a long time, and what I said was a little bit what you would call dissembling. I dissembled slightly. You see, I had been through a lot of experiences, and I knew that time and time again these things don't work. I had read a lot of stuff about extrasensory perception and studied what was known because it was very interesting to me, but it always ended up in a tawdry nothing. So I had every expectation that this was just some kind of a trick. But I'm still very interested; I mean, I'd like to see how he does it, for the fun of it. So I said, "Yes, I'd like very much to meet Uri Geller."

The guy went on about how "skeptical" professors had studied the keys bent by Geller under an electron microscope to understand the forces that might have bent the key, and how it might have melted or not melted—all this nonsense.

I knew that a magician is very clever, and that it's easy to fool me, so I told the man, "Listen, I want very much to meet Uri Geller, but I'll tell you something that's different about me: I'm smart enough to know that I'm dumb."

I had read a lot of stories about extrasensory perception, and I knew that the weakest position to be in is to think you are cleverer than the other guy, and that *he* can't fool you. Because a good magician can do something shouldn't make you right away jump to the conclusion that it's a real phenomenon; you need a helluva lot more rigidity. And you'll find out that

*See "Altered States," in R. P. Feynman, *Surely You're Joking, Mr. Feynman* (New York: Norton, 1985).

99.9 to 100 percent of the time it's *not* something strange, it's not something mysterious, but something ordinary, a trick! But it's fun to *find* the trick, and the only way to find the trick is to be damn sure it's a *trick,* and not be ready to think that it might not be, because otherwise you slip too easy.

A good example of this business about not being smart enough to know how dumb you are is a story about two boys in France, which came out during one of the extrasensory perception phases. They were two simple farm boys who did something or other and told the Signor, who told the priest, who told the mayor, and finally the professors from Paris came—the great psychology professors from Paris—to watch the two boys, and the professors became convinced that the boys really *had* some special powers.

What happened was that in the beginning the boys simply faced each other, and just by moving a little bit, or jiggling, or doing something, they were able to signal each other. Somebody caught on to that and turned them around so they couldn't see each other; then a screen was placed between them; all kinds of stuff, and they were still doing it! It turns out that the last trick was being done with the assistance of an uncle, who was up in an attic and could see both boys, transmitting the signal from one to the other. The boys were getting so much attention, and hearing that the professors were going to come see them the next week, they had time to think about how to improve their trick. Since the boys kept changing the way they signaled each other, and since the professors assumed that the boys were transmitting their thoughts to each other always in the same way, they couldn't figure it out. And the most significant thing is that the professors kept saying, "These are *simple* folk: they're just boys from the farm. We can't imagine that they could be clever enough to fool us; we're not so foolish as to be easily fooled. . . ."—but that's exactly what was happening. The small boys from the farm were fooling the professors from the University of Paris.

So I *knew* that I could be fooled in this way, and figured that guys like Bohm must not have felt they could be as easily fooled as I can be.

A few weeks later my phone rings, and it's Uri Geller. He's in Hollywood, and I can come and see him at his hotel. I asked if my friend Al Hibbs, who was interested in making television programs (and who is a lot quicker at spotting a trick than I am), and my son, Carl, could come. Geller said yes. He particularly liked that my son was coming, because he is especially good in front of children. Carl said, "Great! Great! I'll invent some tests for him to do."

So Carl put together a package. He got some very soft, easy-to-bend pieces of lead from an adding machine that he was taking apart—much easier to bend than a key. He put a piece of carbon paper in an envelope—all Geller has to do is make a mark on the paper. He got a tube made of glass, with stoppers at each end, and put a thin piece of wire inside that Geller was supposed to bend. So Carl invented all these tests which would be *easier* than bending a key, if the bending were done by mental effects, as Geller claimed.

. . . We went to Geller's hotel room and found a very nervous man,

walking back and forth, answering the phone, which rang often. Carl gave him his box of simple tests, and Geller put it aside—he didn't even look at it. Between telephone calls he explained to us that sometimes the power comes, sometimes it doesn't, and he doesn't know where it comes from. He told us various theories that people have suggested: so-and-so says it might be such-and-such; so-and-so says it might be extraterrestrial. Of course, I'm just sitting there and this fog is passing by.

Then Geller handed each of us a little pad of paper and a pencil, and asked us to make a drawing: He's supposed to guess what it is. It was easy to see how he was going to do that, because the top of the pencil moves when you make a drawing, and he guessed in the way a fortune teller does, by suggesting that it might be "this-ish" or "that-ish," and looking at our faces for a sign of excitement, showing that he's on the right track. Of course he had his hands over his head, but what do we know about that? He said things like "There are circles involved . . . (he saw the pencils move) mechanical." It didn't work with us because we were all absolute poker faces.

So Geller's mind-reading didn't work. He then picked up a key, but said the power wasn't coming. We were watching him like hawks. We shouldn't have done that: We should have let him get away with his mind-reading trick, become relaxed, and let him do his stuff. He answered the phone a few more times, saying in between that he didn't have the power right now.

Then he says, "Hey! It often works better under water. Let's try it under water." I don't know what he means, but he goes into the bathroom with a key, and he turns on the faucet. We quickly follow him in there. Al's on Geller's left, Carl's on his right, and I'm behind—all four of us are crowded into this tiny bathroom—the three of us looking down to see if he's got a tool to come out of his sleeve, or what! Nothing happened, I was a bit disappointed: He wasn't able to do one trick; he was not a superstar magician, as I had hoped.

. . . Al called me up later with a hypothesis about the key bending under water. We were all looking for a tool, and saw none, but if Geller could distract us for a moment, he could slip the key into the pipe and quickly bend it, and with all the water rushing down, it would be hard to see. I don't know if that's the way he was going to do it, because we never gave him a chance. •

Luis Alvarez and the Explorer's Quest

He went after the great mysteries of twentieth-century science with the same enthusiasm, excitement, and sense of wonder, adventure, and determination that had driven the great explorers of the earth.

Richard A. Muller

The following remembrance celebrates the life and work of one of the most creative and wide-ranging scientific minds of our time. He has been described as "a stunningly creative individual whose discoveries and inventions spanned an amazing range of frontiers of man's knowledge over more than half a century" and "the best physicist Berkeley ever had." In this era of narrow specialization it is refreshing to realize that some especially able scientists still manage to explore both deeply and broadly many of the world's most profound mysteries. In addition to the interests of Luis Alvarez mentioned here, longtime SI *readers may recall his personal inquiry into the surprisingly high likelihood of seemingly astonishing coincidences, reprinted in* SI, *vol. 6, no. 4, Summer 1982. Our thanks to Richard A. Muller for his remembrance, which appeared earlier in two university publications, and to* LBL Research Review *for the drawing of Luis Alvarez.*

—Kendrick Frazier

LUIS ALVAREZ is no longer with us. He died on August 31, 1988, in his Berkeley home. In his last few months, Luis spent a lot of time thinking and talking about his life. What a glorious life it was! Instead of mourning, we should celebrate the life of this extraordinary man.

Richard A. Muller, friend and protégé of Luis Alvarez, is himself a highly creative scientist, with interests ranging from cosmic microwave anisotropy, accelerator radiocarbon dating, and automated supernova searches, to mass extinctions, the Nemesis hypothesis, and geomagnetic reversals. He is professor of physics at the University of California, Berkeley, and faculty senior scientist at the Lawrence Berkeley Laboratory.

Luis Alvarez, 1911-1988

To many of us he was a friend and a colleague. To the world he was many things—so many, in fact, that the list borders on the implausible. He was the great experimental physicist, the leader of a team whose discoveries with the liquid hydrogen bubble chamber won him the Nobel Prize in 1968.

Before World War II taught the world the meaning of "physics," Luis called himself a chemist. His long list of important discoveries in this period, including the charge of cosmic rays, the magnetic movement of the neutron, electron capture by nuclei, and the radioactivity of tritium, were responsible in part for his election to the National Academy of Sciences at an earlier age than any of his predecessors.

He always credited his mentor, Ernest O. Lawrence, with having invented Big Science, but in the 1960s Luis's bubble chamber team was several hundred people strong, and the largest in the world. Luis and his colleagues were largely responsible for the vast expansion in the list of subnuclear particles, from just a handful to more than a hundred.

Much of the world will remember Luis as the interdisciplinary scientist, whose theory for the Cretaceous Catastrophe has had a major impact on paleontology, geology, geophysics, astrophysics, and the theory of evolution.

Others think of Luis as an inventor, the holder of 40 patents—patents

known for their diversity and importance, including Ground Control Approach (GCA), the Microwave Early Warning System, the Alvarez Linear Accelerator, the tandem version of the van de Graaff, the Materials Testing Accelerator, and numerous clever optical devices. Many times during his life, and more than once when I was present, someone told Luis that his invention of GCA, a radar system that allowed landings in the fog, had saved his life during World War II.

Luis was one of the first inductees into the Inventors Hall of Fame. He never stopped inventing. In his last two years he was working on methods to prevent airplane collisions and devices to detect explosives in airports. One evening I heard on the news about cracks found in the recently completed Alaska pipeline. Luis heard the same news, but, unlike me, he started thinking. By the next day he had invented a device that could travel through the pipeline and automatically find the cracks.

Luis's colleagues in the National Academy of Engineering undoubtedly think of him as a clever and daring engineer, one who maintained a perfect safety record while building and operating the huge liquid hydrogen bubble chamber.

Many of Luis's associates, his employees, and his investors think of Luis Alvarez as an entrepreneur, one who started several successful companies, including Humphrey Instruments and Schwem Technologies. Luis trained his physics students in entrepreneurial skills, necessary these days just to obtain funding from the National Science Foundation. Luis always delegated to his colleagues more responsibility than they thought they were ready for. Just as many of his protegés are busy today in the high-tech business world as in the academic world.

Others properly remember Luis as a detective. He used physics as a tool to search for new chambers in the pyramids, and his clever analysis of the films of the Kennedy assassination helped clarify uncertainties in the Warren Commission investigation.

Some people probably knew Luis primarily as a government advisor, two-time member of the President's Scientific Advisory Committee, member of the Land Committee that set the stage for reconnaissance from space, and participant in countless other high-level technical groups. Luis also was a highly regarded advisor to several high-tech corporations, including Polaroid and the Hewlett-Packard Corporation. His last important committee made a recommendation to the president on what should be done with the new U.S. embassy building in Moscow.

Perhaps some think of him as the past president of the American Physical Society, or as the professor who scored a "perfect 7" from his students in the last physics course he taught.

My children remember Luis Alvarez as the man who bounced them faster and faster on his knee while reciting, "This is the way the ladies ride; this is the way the gentlemen ride; this the way the cowboys ride. . . ." This game has become a Muller family favorite.

Others knew Luis as a great nominator. In the 23 years that I knew

him, I found him just as likely to be writing a nomination for someone as working on a physics problem. He was constantly working for the recognition of other scientists and engineers, usually for someone he thought had been slighted by the rest of the community. Sometimes these were colleagues, but more often they were just people whose major contributions had gone unrewarded. His campaigns for some scientists spanned decades—and frequently met with frustration. Few people knew how hard and persistently he worked at this.

Luis Alvarez was a complex man, one of very few people I know whose opinion on an issue could not be guessed until I discussed it with him—no matter how well I knew his position on other issues. He was not a liberal, conservative, or moderate. He was strongly opposed to the Vietnam war, and he just as strongly felt that the atomic bomb had preserved peace between the U.S. and Russia. He could not be characterized in any simple way; he had no foolish consistencies, and when he gave advice, it was usually surprising, original, incisive, and needed.

How would Luis Alvarez remember Luis Alvarez? I don't think that any of the foregoing images captures the way Luis felt about himself.

Luis believed that he had inherited the quest of the great explorers—of Captain James Cook and Sir Richard Burton. Luis was intimately familiar with the journals of the great explorers, but he was born too late to be one of them. The South Pole, the last place on earth, was reached in 1911, the year that Luis was born.

The great mysteries of the twentieth century no longer lay in geography but in science. Luis went after these mysteries with the same enthusiasm, excitement, and sense of wonder, adventure, and determination that had driven the explorers of the earth. He spent his life trying to put together a map of this unknown world.

Particularly in recent years, while working on the mass extinctions theory—the farthest from his home of physics that his wanderings ever took him—he often suffered the same hardships as the great explorers, namely, shortages of supplies and attacks by the natives. But it was worth it, for in this last great effort Luis Alvarez and his crew discovered a new scientific continent, one that many other scientists are just now starting to exploit.

We are often told that physicists do their best work when young. Luis Alvarez accomplished what I consider his greatest work only after his official retirement.

In 1977 Walter Alvarez arrived in Berkeley and presented his father with a present, a piece of rock he had cut from a hillside in Italy, a piece of rock with a clay layer in it. Walt showed Luis how the microscopic forams that left fossils in the rock just before the clay layer had all disappeared. The giant dinosaurs and the tiny forams, destroyed together.

Luis later described his experience in examining this rock as one of the most exciting moments in his life. Some of us know the result of that moment. The ensuing scientific period has been immensely exciting for geologists, paleontologists, physicists, chemists, and astronomers. The wide coverage of

their work in newspapers and magazines led directly to a popular revival of interest in dinosaurs, one that is still going on. The scientific consequences, which include the nuclear winter theory, are still being uncovered.

Very often in science, the discoverer is simply the person who got there first. Rarely can we say that without the efforts of a particular individual or team, a discovery would have been missed for decades—or for even more than a year. But I believe that this is the case with the impact theory. It could have been discovered two decades earlier, and it could easily have been missed for another two decades. In part, this is why I consider Luis's work on this problem to be his greatest contribution to science.

It is particularly wonderful that last year Luis and Walter received a special honor, an honor that is extremely rare for living scientists. The International Astronomical Union accepted the recommendation of Eugene Shoemaker, the discoverer of a new asteroid, that it be named Asteroid Alvarez, not just after Luis but after the father-and-son team. I believe that the greatest joy of the last decade of Luis's life came from working closely, professionally, and creatively with Walter.

I shall always remember Luis Alvarez as a man who loved thinking above all else. He was always thinking. Only one out of every ten ideas, he said, was worth pursuing. Only one of ten of these would last a month. Only one of ten of these would lead to a discovery. If these figures are true, then Luis must have had tens of thousands of ideas.

To the world, his legacy consists of his ideas, discoveries, and inventions. To his friends, the legacy of Luis Alvarez is his example. •

A Reminder . . .

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The Two Cultures: A Resurrection

The real gulf is not the gap between the arts and the sciences but the canyon between those who practice genuine scientific thinking (whether or not they have a scientific background) and everyone else, including many scientists and engineers highly trained in narrow specialties.

Lewis Jones

WHEN C. P. SNOW floated the idea of two cultures—in his famous 1959 lecture and book—30 years ago this year, he said, "I felt I was moving among two groups—comparable in intelligence, identical in race, not grossly different in social origin, earning about the same incomes, who had almost ceased to communicate at all."[1]

He felt that the whole of Western society was being split into two polar groups, "as though, over an immense range of intellectual experience, a whole group was tone-deaf."

Snow had twanged a public nerve, and the great arts-and-science split was no longer just a subject for private jokes within each camp: "Articles, references, letters, blame, praise were floating in—often from countries where I was otherwise unknown. The whole phenomenon in fact . . . hadn't much connection with me."

The immediate results were predictable. The literati chortled afresh over the stylistic shortcomings of scientists' writings. Scientists resurrected arts-stream howlers from such sources as "The Ancient Mariner," by Samuel Taylor Coleridge:

> Till clomb above the eastern bar
> The hornéd Moon, with one bright star
> Within the nether tip.

Lewis Jones is a writer living in London.

Snow had fingered two real underground armies. His insight was valid, and there was a genuine point to be made. But then he blew it. Just how will become clear, I hope, as we go along.

The nub of the matter is a semantic fact of life that is rarely acknowledged—that the word *science* is used with two separate meanings. When speakers and writers slide from one to the other without acknowledgment, problems arise.

There is science as a method of problem-solving: the very best method we know in fact. It is almost synonymous with "scientific thinking." It is usually somewhat grandly referred to as the hypothetico-deductive method. Ground down to its essence, it is the method of guess-and-test. Most important, it is beholden to no particular subject matter. All is grist to its mill: choosing the best vacuum cleaner for your purposes, finding whether homeopathy works, and so on. Because science in this sense is basic to all rational inquiry, I propose to call it "Science-1."

To the layman, "science" is assumed to mean fizz-and-chem, with perhaps biology thrown in. In other words, science is treated as a catch-all term for a particular group of subjects: the kind in which scientific thinking has paid off most spectacularly. I propose to call this bundle of subjects "Science-2," because it is derivative.

The semantic waters are further muddied by the fact that the word *scientific* straddles both areas, while the word *scientist* covers only those who work with Science-2.

There are scientific thinkers whose daily work does not deal with particular Science-2 subjects, just as there are professional scientists who seem unable to handle Science-1. For example: Are aliens from outer space visiting us in flying saucers? I give you (courtesy of Robert Sheaffer) the case of a member of the Royal Society—a genuine scientific superstar—investigating UFOs.

Investigations covered *only* those sightings that came from sober, credible persons whose testimony would be accepted in any court of law. The signal was carefully separated from the noise. Hearsay, rumor, and speculation were strictly discounted in favor of reliably witnessed observations and reports. The unavoidable conclusion was that there was a hard-core residue of cases for which there was no other explanation.

Well, I cheated a little to spark your interest. But to make the report true all you have to do is remove the word *UFO* and insert the word *witches.*

The leading light of science was real enough—Robert Boyle, author of *The Skeptical Chemist* (1661), who gave his name to Boyle's Law. This Science-2 superstar finally faced the unavoidable conclusion that people really could change into animals and women could give birth to serpents and toads.

There is an old joke among psychiatrists concerning the patient who was convinced that he was dead. "Do corpses bleed?" the psychiatrist asked him. "No, they don't." Whereupon the psychiatrist cut the man's finger and pointed to the blood. "My God," said the man, "they *do* bleed."

It's a classic case of deficiency of Science-1. But before you write off

Many of the citizens of Science-1 country know next to nothing of physics. But they are used to asking: How would I test that? What is the evidence for it?

the anecdote as implausible, consider the case of a real Science-2 expert faced with the same decision.

Your examplar this time is Charles Richet, the distinguished French physiologist who went on to win a Nobel prize. He tested the spirit-form Ben Boa, to see whether it was human or an otherworldly emanation. He required it to breathe through a tube into a bottle of baryta-water.

The liquid turned white, showing that carbon dioxide had been exhaled. Richet concluded that he had made a new discovery about ghosts. Or as he may well have said, "My God, they *do* breathe."

Science-1 still can't rely on support from exponents of Science-2.

Alfred Russel Wallace was an earnest believer in spiritualism, and his Science-2 status did not prevent him from theorizing that "if a form is seized which is really distinct from the medium, yet the result may be that the form and the medium will be forcibly brought together, and a false impression created that the form *was* the medium." (How's that again?)

The World Health Organization has given its seal of approval to acupuncture as a serious treatment for 44 conditions, including acute bronchitis, conjunctivitis, cataract (uncomplicated), myopia in children, and the common cold.

Auricular acupuncture is based on the notion that the external human ear corresponds point by point to the organs and functions of the human body, and is usually represented by drawings of a dwarf fitting snugly within the outline of the outer ear. This "medieval lunacy," as Petr Skrabanek calls it, has found its way into the *Journal of the American Medical Association, Pain,* the *Lancet,* and the *American Journal of Medicine.*

Richard Nisbett and Lee Ross have drawn together a vast amount of cognitive research material in *Human Inference: Strategies and Shortcomings of Social Judgment.*

"Getting to the moon," they say, "was a joint project, if not of *idiot savants,* at least of savants whose individual areas of expertise were extremely limited—one savant who knew a great deal about the propellant properties of solid fuels but little about the guidance capabilities of small computers, another savant who knew a great deal about the guidance capabilities of small computers but virtually nothing about gravitational effects on moving objects, and so forth.

"Finally, those savants included people who believed that redheads are hot-tempered, who bought their last car on the cocktail party advice of an acquaintance's brother-in-law, whose mastery of the formal rules of scientific

inference did not notably spare them the social conflicts and personal disappointments experienced by their fellow humans."

If this seems a little harsh, reflect that Wernher von Braun, deputy associate administrator for planning at NASA headquarters till 1972, and certainly one of the most important figures in the first decades of the American space program, wrote the foreword to *From Goo to You by Way of the Zoo,* a put-down of evolution intended for young readers. Von Braun also wrote the California Board of Education a letter in the form of a tract by the Bible-Science Association, advocating the teaching of creationism in schools.

Astronaut Jack Lousma has announced, "If I can't believe that the spacecraft I fly assembled itself, how can I believe that the universe assembled itself?"

Over-reliance on a particular subject of Science-2 carries its own risk—it may not be the appropriate specialization for the matter in hand.

And yet in decisions that have an unavoidable right-wrong feedback, "I am prepared to bet," said science philosopher Philip Kitcher, "that Creationists, like the rest of us, take care to consult the *appropriate* experts. I doubt that they take their sick children to the vet."

But the words *science* and *scientist* are themselves used as smokescreens. Nowhere is this more evident than with those who claim to perform "paranormal" feats. To have a "scientist" on the judging panel—or better still, an entire panel of scientists—is the desire of every such claimant.

It can sound impressive to be proved genuine by a panel of three "scientists." But this ploy only works because of the media's assumption that a Science-2 specialist is automatically a Science-1 thinker.

Things can look much less impressive if you spell out the Science-2 affiliations of those involved and have to admit that your specialist investigators into psychic phenomena were, say, an oceanographer, an engineer, and a botanist. Laymen seldom realize that Science-2 specialists may not even be competent to investigate one another's disciplines.

But ominous moves are afoot in the name of science. Harry Collins, director of the Science Studies Centre at the University of Bath, wants Science-2 specialists to take over all of science and run it as a closed shop.

Miffed at the use of magicians to detect fraud in claims of the paranormal, he complains: "Something has gone wrong! An outside professional group is being invited to arbitrate in the internal affairs of science. Interference that most professional groups would resent is being welcomed by many scientists. Why is this? . . . To hand over so much power is a mistake. . . . Scientists would do well to try to contain as much control over the arbitration of knowledge claims about the natural world as they can."

The claim that Science-2 experts should be made the sole appointed guardians of Science-1 flies in the face of the evidence presented by David "Daedalus" Jones. "The most staggering surprise of my career as a perpetual-motion charlatan," he wrote in *New Scientist* in 1983, "was to come across people who believed in it for real." In particular, working engineers in a competition who "put forward apparently serious perpetual-motion schemes

without even noticing that they are violating one of the most fundamental laws of physics."

In summary: "This experience of devising and exhibiting what in effect were elaborate conjuring tricks has taught me a lot about the various weaknesses of the scientific mind. My strongest conclusion is that engineers and scientists are remarkably gullible, and easily taken in by conjuring tricks."

I know of no better illustration of these simple truths than the history of parapsychology. The fake medium Eusapia Palladino was "investigated" by the illustrious Richet; Schiaparelli (head of the Milan Observatory); Oliver Lodge; the astronomer Flammarion; Morselli (head of a clinic for nervous and mental diseases); Botazzi (head of the Physiological Institute of the University of Naples); Foa (professor of pathological anatomy); and Pierre and Marie Curie.

But Palladino's exposure was brought about by the magician J. N. Maskelyne, who said, "No class of men can be so readily deceived by simple trickery as scientists."

Matters have reached the stage where John Beloff, of Edinburgh University's Department of Psychology, can give public warning of the *danger* of "exclusive preoccupation with the experimental evidence."

The curious thing is that even anti-scientific enterprises hanker after the trappings and labels of science. Soothsayers now prefer to be called psychics; second sight now seeks to be known as remote viewing; thought-readers wish to be described as telepathists.

In the Soviet Union, dowsing has become "the biophysical effect"; in Bulgaria, it is radiesthesia, and even (in perhaps the ultimate upmarket move) the psycho-bio-physiological method of finding water.

Some purveyors of telepathy wish their talent to be known as biocommunication. And astrologers have taken to calling themselves everything from cosmobiologists to astral physicists.

The magical prefix *para-* is itself a plea to be excused from embarrassing evidential requirements, while still retaining the prestigious label "science." In the same way, okay names in Science-2 (Brian Josephson, Hans Eysenck, Sir Alister Hardy, Fred Hoyle, John Hasted) are paraded under the banner of Science-1. It is dishonest.

Francis Crick was once asked what characterized a man who understood science. Crick replied, "Knowing the difference between an atom and a molecule." He was wrong. This criterion is tied to physics, one of the Science-2 subjects. Any man who understands the need for a control group would win hands down when it comes to assessing astrology or osteopathy or hypnotic trance.

Obviously, not all Science-2 specialists are Science-1 duffers. A physicist whose wife had died noticed that the bedside digital clock had stopped at 9:22—the time on the death certificate.

"Arlene had kept this clock by her bedside all the time she was sick, and now it had stopped the moment she died. I can understand how a person who half believes in the possibility of such things, and who hasn't got a doubting mind—especially in a circumstance like that—doesn't immediately try to figure out what happened, but instead explains that no one touched the clock, and there was no possibility of explanation by normal phenomena.

"I saw that the light in the room was low, and then I remembered that the nurse had picked up the clock and turned it toward the light to see the face better. That could easily have stopped it."

If you are familiar with the quality of mind of the late Nobel-laureate Richard Feynman, you will perhaps not be surprised that his thinking processes were as scientific outside his specialty as inside it.

It often seems that one of the hardest things for a Science-2 expert to do is to freely acknowledge his status as a layman in matters outside his own specialty.

When Uri Geller's record came out on Polydor, the jacket reproduced a letter from John Taylor, professor of mathematics at King's College, London: "I have tested Uri Geller at King's College [and] the Geller effect—of metal bending—is clearly not brought about by fraud."

And yet (to look on the bright side) there also exists another statement on the headed notepaper of that same King's College:

> To whom it may concern: Mr. James Randi appeared before us today at the Department of Biophysics and demonstrated in a laboratory his ability to bend and break spoons and keys that we supplied. He caused bursts on a Geiger counter and made one of the spoons become flexible and finally break in two while one of us held it at each end. Then Mr. Randi caused a compass needle to deflect by about 15° and caused several watches to advance.
>
> We were made well aware in advance that Mr. Randi appeared before us as a conjuror, and we watched him closely, knowing that he was doing tricks. We gave him no advantage that might be given to a "sensitive."
>
> After the performance, he revealed to us how some of the tricks had been done.
>
> We believe that in investigating phenomena of apparently paranormal nature a qualified conjuror must be closely involved.

Appended to this unusual example of Science-1 in action were the signatures of Maurice H. F. Wilkins, FRS (who shared the Nobel Prize

in Physiology and Medicine with Crick and Watson), Ted Richards, Ph.D., (chemistry), Christopher Evans, Ph.D (psychology), David Davies, Ph.D. (geophysics), and Roger Woodham, Ph.D. (cosmic rays).

But confusion between genuine scientific thinking (Science-1) and the restricted field of expertise that characterizes a special subject (Science-2) is still very much in evidence.

The ambiguity was nicely highlighted in a *New Scientist* editorial of February 21, 1985: "It is nice to know that people have a fair contempt for astrology. However, is it really acceptable that so many people answer *don't know* when asked to name a scientific achievement or recall the name of a famous scientist?" The idea that knowing a scientific achievement or the name of a famous scientist will be of any use in assessing, say, astrology is the very crux of the confusion between Science-1 and Science-2.

Where has all this got us in the matter of the Two Cultures? C. P. Snow wrote:

> Once or twice I have been provoked and have asked the company how many of them could describe the Second Law of thermodynamics. The response was cold: it was also negative. Yet I was asking something which was about the scientific equivalent of: *Have you read a work of Shakespeare's?*
>
> I now believe that if I had asked an even simpler question, such as, What do you mean by mass, or acceleration—which is the scientific equivalent of saying, *Can you read?*—not more than one in ten of the highly educated would have felt that I was speaking the same language. So the great edifice of modern physics goes up, and the majority of the cleverest people in the western world have about as much insight as their neolithic ancestors would have had.

Snow had certainly rooted out the existence of two opposing camps, but he had *misplaced the frontier between them.* Science-2 has nothing to do with either of them. In reality, the Grand Canyon of the intellect is hewn between, on the one side, the practitioners of Science-1, and on the other side, *everybody else.*

Many of the citizens of Science-1 country know next to nothing of physics. But they are used to asking: How would I test that? What is the evidence for it? How likely is it that this was no more than a coincidence? Is there an alternative explanation? Was there a control group? They sometimes look across the canyon in genuine puzzlement at the behavior of their cousins.

Some of these cousins are hotshots at Science-2 specialties, and some are not. But none of them are looking back across the canyon with any curiosity. They are too busy examining their horoscopes, cultivating their alpha rhythms, and having their ailments diagnosed by reflexologists.

Although Isaac Asimov is a tireless champion of Science-2, he has no illusions about where real science lies.

> When I was turning out book after book in steady progression and giving a copy of each to my father as a matter of course, he looked through one of

my more difficult popularizations and finally managed to ask me something that must have long puzzled him.

"Isaac," he said hesitantly, "where did you learn all this?"

"From you, Pappa," I said.

"From *me?*" he said. "I don't know one word about these things."

"Pappa," I said, "you taught me the value of learning. That's all that counts. All these things are just details."

Note

1. C. P. Snow, *The Two Cultures and the Scientific Revolution* (Cambridge University Press, 1959). A revised edition, *The Two Cultures: And an Afterthought,* was issued by CUP in 1969. •

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The 'Top-Secret UFO Papers' NSA *Won't* Release

The National Security Agency has reasons unrelated to UFOs to withhold these 156 classified papers. A former NSA employee who has seen them says they contain no worthwhile information on UFOs.

Philip J. Klass

IF YOU CHANCE to catch Stanton T. Friedman, UFOlogy's most colorful spokesman, in one of his frequent television, radio, or lecture appearances, you will hear him accuse the U.S. government of a UFO coverup that he calls a "Cosmic Watergate." Friedman, a nuclear physicist turned UFO lecturer, is a P. T. Barnum–type showman who typically charges that the National Security Agency (NSA) is withholding "160 top-secret UFO documents."

As proof, Friedman holds up several pages of a heavily censored, once top-secret petition submitted by NSA to the U.S. District Court in Washington explaining why release of the documents would likely "damage . . . our national security." NSA's position was endorsed by a U.S. District Court, a subsequent three-judge Federal Court of Appeals, and the U.S. Supreme Court. Thus NSA *is* withholding 156 UFO-related papers—almost the 160 that Friedman typically claims.

This might seem to show that Friedman is correct and there is indeed a U.S. government UFO coverup. But in reality, it is Friedman who is guilty of withholding information from the public about these NSA papers—information that would challenge his claims.

Friedman typically identifies NSA as the nation's largest and most secretive intelligence agency, which is true. But he never describes its several missions (which are known to him as a result of reading James Bamford's 1982 book about NSA, *The Puzzle Palace*) that could explain NSA's actions.

Philip J. Klass is a veteran aerospace editor and investigator of UFO claims. His most recent books are UFO Abductions: A Dangerous Game *and* UFOs: The Public Deceived *(Prometheus Books). He lives in Washington, D.C.*

One of NSA's primary missions is to eavesdrop on radio communications of potentially hostile countries, referred to as "communications intelligence," or COMINT. A second mission is to "crack" the cryptographic codes of other countries in order to decipher their intercepted communications. NSA's third mission is to develop cryptographic techniques for U.S. government and military agencies that it hopes will be impervious to being cracked by other nations.

According to the NSA petition to the U.S. District Court, the 156 "records being withheld are COMINT reports that were produced between 1958 and 1979." This means that these are decoded transcripts of intercepted messages from foreign government sources, most likely Soviet-bloc countries. They may have been intercepted by U.S. agents in the USSR or in Soviet-bloc countries, or even from covert facilities in "neutral" countries.

If any of them contained "smoking gun"-type "UFO secrets"—for example, revelations that the USSR knew that UFOs were extraterrestrial craft—it would be foolish for the U.S. government to try to maintain a "UFO coverup," since it could be exposed at any time by Soviet leaders. The relatively small number of such records in NSA's possession, collected over a 21-year period, indicate very scant interest in UFOs by Soviet-bloc countries. The average is less than one a month.

Friedman never acknowledges that NSA might have good reason, other than a UFO coverup, to withhold such documents. He must surely recognize that they could reveal sources and facilities unknown to the Soviet bloc and, more important, *which cryptographic codes have been cracked by NSA and are no longer secure.* While the USSR itself may no longer be using some of the older codes, when they are replaced with new ones they are typically given to and used by other countries in the Soviet bloc.

Fortuitously, Tom Deuley, a man with a strong interest in UFOs, went to work for NSA in mid-1978 and was employed there for four years. He was at NSA during the period when Citizens Against UFO Secrecy (CAUS) was trying to force the agency to release the documents. Deuley is now active in the UFO movement, serving as an official in two UFO organizations: the Mutual UFO Network (MUFON) and the Fund for UFO Research (FUFOR).

In late June 1987, Deuley presented a paper at a MUFON conference in Washington entitled "Four Years at NSA—No UFOs." In his paper Deuley said he had transferred to NSA headquarters just prior to attending the 1978 MUFON conference in Dayton, Ohio. "Before making the trip," Deuley said, "I felt it was necessary to let NSA know I had an interest in UFOs. . . . Within a week I had an appointment with some administrative officials to discuss my trip to Dayton and my interest in UFOs." Based on that meeting, Deuley said he did not "get any feeling that they [NSA] even cared about UFOs."

As a result of the meeting, Deuley said, he "met several other persons at NSA, and from other agencies, who had maintained their own interest in UFOs over the years," and these NSA associates sent him newspaper

Stanton T. Friedman, in one of his frequent TV appearances, displays what he claims to be proof of the government's cover-up of significant UFO data—a heavily censored "Top Secret" court petition from the National Security Agency. Friedman withholds the full facts about NSA's UFO documents.

clippings and cartoons about UFO incidents.

Because of Deuley's interest in UFOs, he was one of those selected by NSA to review its UFO-related material. Said Deuley: "I believe I saw or held copies of the large majority of the documents [that were] withheld in that FOIA suit. Though there may have been exceptions among the documents I *did not* see, none of the documents I was aware of had any information of scientific value."

The former NSA employee told the MUFON conference audience: "I did not see any indication of official NSA interest in the subject [UFOs]. . . . I did not see any exchange of material indicating any form of follow-up activities. . . . I did not see any indication of real involvement other than the existence of the documents themselves."

Deuley endorsed NSA's withholding the material, noting the need to protect intelligence sources and methods. "It is clear to me that the possibility of damage to national security sources and methods far outweigh the value of the information under question."

Deuley concluded that if NSA was "involved with UFOs in any active way, I would have at least caught a hint of it in their treatment toward me or that with my openness about the subject, some informal contact would have mentioned it. Because neither of these occurred, *I concluded that UFOs do not have any importance at NSA.*" (Emphasis added.)

Because I was attending another concurrent session at the MUFON conference and did not hear Deuley's paper, I wrote him to obtain a copy.

When he sent it, he wrote that his paper was aimed at "deterring UFO investigators from wasting their time trying to get at the papers that NSA was allowed to withhold." He added: "The documents . . . are not worth the effort, in terms of forwarding the effort of UFO research."

On July 25, 1987, I sent a copy of Deuley's paper to Stanton Friedman, wondering if he would accept the views of a first-hand observer who was a fellow "UFO-believer." Several months later, Friedman and I appeared on a television show in Portland, Oregon, and he again whipped out the heavily censored NSA court petition for the television audience as proof of a "government coverup." Friedman made no mention of the content of Deuley's MUFON paper.

More recently, on December 9, 1988, when Friedman and I participated in a talk-show on Seattle radio station KING, he was asked to document his charge of a government UFO coverup. Friedman responded: "The National Security Agency admits it has 160 UFO documents. They're highly classified. It not only refuses to release them . . ." Again, no mention of Deuley's statements.

The foregoing may provide a useful perspective when one chances to see or hear Friedman make his Cosmic Watergate charge and cite the NSA papers to support his claim. •

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The Metaphysics of Murphy's Law

Murphy's Law sums up our attempt to make disorder into order.

Robert M. Price

SOME READERS may be able to recall a recurrent scene in the old "McHale's Navy" television series. The tormented Captain Binghamton would, like Job, cry out, "Why *me?* Why is it *always me?*" To this anguished question there have been many answers, the latest and funniest of which is "Murphy's Law": "If anything can go wrong, it will" (*ML,* 11).[1] This proverblike slogan is meant at least half-seriously. On the one hand, the very formulation as a "law" is humorous, because we do *not* literally believe our daily plague of nuisances is deterministically caused. On the other hand, the very aptness of the joke implies that we *do* sort of suspect there are karmic gremlins ever lying in wait for us, monkey wrenches at the ready. How often, after all, do we find ourselves commenting on an annoyance, "Wouldn't you just *know* it?" In other words, it should have been predictable, and this implies a law at work. Perhaps our laughter at Murphy's Law is nervous laughter, whistling in the dark against the fear that there *is* a cosmic conspiracy. Let us examine Murphy's Law together with a few of its endless corollaries. We may gain clearer insight into the metaphysical status of our fatalistic proverb.

What Is Murphy Describing?

Actually, the body of maxims that huddle beneath the umbrella of Murphy's Law may be divided into at least three separate kinds of observations. First, there are proverbs about *human nature.* They seem at first to describe the cruel workings of fate, but on closer examination they can be seen as simple observations on human frailty. Just a bit of rephrasing will reveal this. For instance, take a look at Finagle's Second Law: "No matter what the anticipated result, there will always be someone eager to (*a*) misinterpret it, (*b*) fake it, or (*c*) believe it happened to his own pet theory" (*ML,* 15). Here the cards are not cosmically stacked against you; rather, you simply have to

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realize that so many people are petty, selfish, and competitive that you are seldom going to avoid peevish opposition. Or take Chisolm's Law, first corollary: "If you explain so clearly that nobody can misunderstand, somebody will" (*ML,* 14). All this means is that some people are impenetrably stupid, and there are enough of them that at least one is likely to show up in your audience. The point is much the same in the case of the eighth corollary to Murphy's Law: "It is impossible to make anything foolproof because fools are so ingenious" (*ML,* 11). The first corollary, "Nothing is as easy as it looks" (*ML,* 11), simply reflects our tendency to make premature judgments.

A second group concerns the fact of *entropy,* the second law of thermodynamics, whereby all closed systems tend toward greater energy-loss and structural disorder. Simon's Law merely paraphrases this law: "Everything put together falls apart sooner or later" (*ML,* 17). Murphy's fifth corollary does the same: "Left to themselves, things tend to go from bad to worse" (*ML,* 11). Issawi's Law of the Conservation of Evil insightfully sums up the entropic dilemma of all social reform efforts, given the finitude and ambiguity of life: "The total amount of evil in any system remains constant. Hence, any diminution in one direction—for instance, a reduction in poverty or unemployment—is accompanied by an increase in another, e.g., crime or air pollution" (*ML,* 84). Nothing mysterious here, however regrettable.

We reach the real issue with our third category, the proverbs dealing with what we will call Negative Synchronicity. The name is derived from the theories of Carl Gustav Jung. More about this momentarily. For the time being, it is enough to know that Negative Synchronicity implies a real pattern of nasty nuisances. Here the cards *are* truly stacked against the poor schmuck. Murphy's Law presupposes this: "If anything can go wrong, it will" (*ML,* 11). As does its third corollary: "If there is a possibility of several things going wrong, the one that will cause the most damage will be the one to go wrong" (*ML,* 11). The following laws also outline the cosmic conspiracy. Johnson's Third Law: "If you miss one issue of any magazine, it will be the issue which contained the article, story or installment you were most anxious to read" (*ML,* 27). Atwood's Fourteenth Corollary: "No books are lost by lending except those you particularly wanted to keep" (*ML,* 27). Boob's Law: "You always find something the last place you look" (*ML,* 31). Jennings's Corollary to the Law of Selective Gravity: "'The chance of the bread falling with the buttered side down is directly proportional to the cost of the carpet" (*ML,* 41).

None of these strokes of ill luck may be ascribed to entropy; even though they all concern disorder, it is only disorder relative to our desires. Or to put it another way, the "order" being eroded here is that of human convention. It is all the same to the rug if the buttered or the plain side of the bread falls on it. It only matters to *us.* This observation hints that our third category might fall under the first. Are these not really insights into human nature, in this case into our spotty perception? Is the "Law of Selective Gravity" perhaps merely an alias for the "Law of Selective Memory"? Is it that we just have no reason to recall those many times when the buttered bread

did *not* stain the rug? By default, then, bad things *seem* to happen with vicious regularity. Only one team's points are being counted. But this explanation is too facile. When we honestly try to recall, we cannot remember several times when the rug might have been ruined but was not. Nuisances *do* seem to predominate. If all this bad luck may be called Negative Synchronicity, perhaps a brief look at Jung's original theory will give us a few clues as to what is going on.

Synchronicity and Paranoia

One of the most intriguing tangents pursued by Jung was his hypothesis of an "acausal principle" that would explain truly meaningful coincidences, such as precognitive dreams, answered prayers, faith healings, astrology, ESP, and the *I Ching*. Jung took all these phenomena seriously, but he tended to reject the magical causation implied in their usual explanations. Instead, he sought one rational explanation for all such puzzling events. His curiosity had been piqued by several personal experiences, including this one:[2]

> A young woman I was treating had, at a critical moment, a dream in which she was given a golden scarab. While she was telling me this dream . . . suddenly I heard a noise behind me, like a gentle tapping. I turned round and saw a flying insect knocking against the window-pane from outside. . . . It was the nearest thing to a golden scarab that one finds in our latitudes, a scarabaeid beetle. . . . (*S*, 22)

Jung admitted that all such occurrences were *coincidental* in the sense that neither event caused the other. But he denied that they were *random*. No, their *meaningfulness* was undeniable. Such phenomena led him to frame his proposed "Law of Synchronicity." He remarked that "the term itself explains nothing; it simply formulates the occurrence of meaningful coincidences which, in themselves, are chance happenings, but are so improbable that we must assume them to be based on some kind of principle,

or on some property of the empirical world" (*S,* 115). But he did go on to try to explain the "how" of Synchronicity. Jung suggested that ancient thinkers were right in claiming there is a unity, or harmony, between our inner (psychic) and our outer (physical) worlds. Jung believed that these two worlds, the microcosm and the macrocosm, respectively, are linked via the "archetypes." These are meaning-structures of the "collective unconscious," the racial mind and memory of humanity. Yet, like Plato's ideal "Forms," these archetypes are not confined to the human mind. They transcend the mind and exist also in the universe at large. (One result of this state of affairs is that we do not simply *read* meaning *into* the world; rather the world *is meaningful.*)

Synchronicity, then, is the "hypothesis that one and the same (transcendental) meaning might manifest itself simultaneously in the human psyche and in the arrangement of an external and independent event" (*S,* 66). At certain moments of heightened spiritual awareness, the archetypal meaning-structure that spans the mind and the world flashes into visibility. This happens in the form of a "meaningful coincidence." The one event does not cause the other, but the pattern of the universe becomes visible to us in their congruency.

Despite the apologetical efforts of Ira Progoff (*Jung, Synchronicity, and Human Destiny*), Jung's theory is not taken very seriously by anybody except dyed-in-the-wool occultists. Indeed, it must have been this kind of thing that led Freud to long for the good old days with "Jung at a time when this investigator was a mere psychoanalyst and did not yet aspire to be a prophet. . . ." It is not our intention here either to vindicate or to debunk Jung's concept of Synchronicity, intriguing as it is, but only to use it for illustrative purposes.

So much for Synchronicity, then. What about Negative Synchronicity? If the frustrating phenomena described by Murphy's Law are to be seen in terms like those of Jung's Synchronicity, what are we left with? It is not a happy prospect, for Murphy's Law *as a real metaphysical law* would imply the existence of a cosmic pattern of mischief inimical to man, as if God were the devil. If one wishes to see the practical effects of believing such a doctrine, there are "true believers" available. Who is it that seriously believes the world is "out to get them"? Why, quite simply, paranoid schizophrenics. Among their psychoses are delusions of grandeur and their corollary, the persecution complex. The paranoid imagines himself to be so important that virtually everyone is bent on spoiling his happiness, even destroying him. Murphy's Law seen as Negative Synchronicity would spell universal paranoia, a world-view corresponding exactly to the paranoid's.

Fortunately, there is one important difficulty in putting Murphy's Law into the same category with Jung's principle. Whereas Jung's theory sought to account for coincidences communicating some definite *meaning* to an individual, Murphy's Law deals precisely with instances of absurdity, i.e., *meaninglessness.* When the buttered side of the bread ruins the rug, when the lost article wastes our time by hiding in the last possible place we look,

when the hammer falls into the least accessible corner, our structure of meaning is flouted. The only "pattern of meaning" in Murphy's Law is the repeated *denial* of meaning.

A Method to the Madness

We are finally close to finding the key to Murphy's Law. Anthropologists and psychologists have pointed out how desperate we are to find predictability in our all-too-uncertain world. Gustav Jahoda gives examples showing that no matter how often disappointed, human beings will cling to various schemes of divination. Since their success rate is poor, it can only be the temporary feeling of security offered by these techniques that continues to make them attractive. If a given prediction ritual gives success only 50 percent of the time, it gives temporary relief from the feeling of helpless ignorance 100 percent of the time.[3]

But what about the other 50 percent? Mustn't there be at least some rationalization for why the technique failed this often? It cannot have just "not worked." Instead, there must have been some insidious counterforce or counter-law at work. This thinking is the origin of belief in witchcraft, or the evil magic that counteracted one's own magic.[4] An example that points even more clearly to what is really going on here is the mythical Eris, goddess of chance and disorder. A goddess who *controls disorder!* The point is that we cannot seem to face the radical ambiguity and randomness of the universe, so we make even disorder into order!

Murphy's Law is our version of Eris. It probably ought to surprise us that things work out as well as they do! But instead we project our desired order onto the world, and then feel that we need some explanation for the "problem" of "why things go wrong." It will not stop them from going wrong, but we hope to fend off the awful uncertainty of ignorance by at least ascribing some method to the madness. And that method is summed up in Murphy's Law.

Notes

1. Arthur Bloch, *Murphy's Law and Other Reasons Why Things Go Wrong!* (Los Angeles: Price/Stern/Sloan, 1978). Quotations from this work are cited in the text using the abbreviation *ML*.

2. C. A. Jung, *Synchronicity: An Acausal Connecting Principle* (Princeton: Princeton University Press, 1973). Quotations from this work are cited in the text using the abbreviation *S*. Synchronicity is also helpfully discussed in Arthur Koestler, *The Roots of Coincidence* (New York: Vintage, 1973), and Ira Progoff, *Jung, Synchronicity, and Human Destiny* (New York: Dell, 1975).

3. Gustav Jahoda, *The Psychology of Superstition* (Baltimore: Penguin Books, 1970), p. 134.

4. See the classic study by E. E. Evans-Pritchard, "The Notion of Witchcraft Explains Unfortunate Events," in *Witchcraft, Oracles and Magic Among the Azande* (Oxford: Clarendon Press, 1937), Part 1, Chap. 4. •

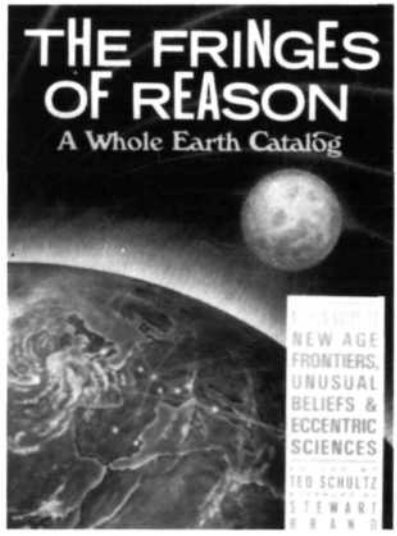
Book Reviews

Cornucopia of Eccentric Sciences

The Fringes of Reason: A Whole Earth Catalog. Edited by Ted Schultz. Harmony Books, New York, 1989. 224 pp. Paper, $14.95.

Brian Siano

IN THE WINTER 1988-89 SKEPTICAL INQUIRER, I reviewed Ivan Stang's *High Weirdness by Mail,* a hilarious compendium of fringe and crackpot information sources. I mentioned that the book was an expansion of a shorter list Stang had published in the *Whole Earth Review*'s Fall 1986 issue, which was devoted to strange beliefs and eccentric science, and that the book had managed to provide a much-needed field guide to the fringe. Now, the Whole Earth people have upped the ante with an expanded version of that issue. *The Fringes of Reason* might not provide the laughs-per-page of Stang's book, but it is better researched, more informative, and might just be the best picture of the New Age movement(s) currently in vogue.


THE FRINGES OF REASON
A Whole Earth Catalog
NEW AGE FRONTIERS, UNUSUAL BELIEFS & ECCENTRIC SCIENCES
TED SCHULTZ
STEWART BRAND

As we should all recognize, one of the problems in evaluating the New Age is simply defining it. Its earlier roots are certainly honorable; the advent of humanistic psychology in the 1950s, coupled with the cultural advances of the 1960s, has given American society the willingness to question meaning in our lives, as well as more options to choose from as alternatives. But during the 1980s, much of the movement has been swamped with vulgarized mysticism sold as "expanded consciousness," "holistic" pseudoscientific claims, and a return to superstition and popular myth as a structure for validation. Sadly, this is what has attracted the attention of the news media, and even worse, it is what seems to be attracting most people to the movement.

Brian Siano is a freelance writer and researcher in Philadelphia and one of the organizers of the Delaware Valley Skeptics.

The *Whole Earth Review* has been one of the better magazines within the movement, and one that, thankfully, has rarely lapsed into an uncritical, pro-paranormal point of view. Usually, its content has been a combination of alternative technologies, sources of reliable information on whatever its staffers were interested in, and some of the better social and philosophical speculation around. Along with the SKEPTICAL INQUIRER and the *Utne Reader,* it's one of those magazines my friends get subscriptions to at Christmastime.

To the publisher's surprise, the "Fringes of Reason" issue, subtitled "Strange Myths and Eccentric Science" (Fall 1986) was the first *Whole Earth Review* to be sold out. And thankfully (since my copy is getting very dog-eared and ragged), Whole Earth has seen fit to expand the issue to an indispensable and enjoyable book. It is not without flaws, which I'll get to in a moment, but I don't think any self-respecting examiner of paranormal claims should be without *The Fringes of Reason.*

I don't even know where to begin describing its delights. It starts off with "The End," a discussion of end-of-the-world predictions and how they have fizzled over the years (including the "Harmonic Convergence" of August 16-17, 1987). In sidebars, Jeane Dixon and Edgar Cayce come in for some solid examination—especially timely as the year 2000 approaches. Lawrence Jerome, author of the new book *Crystal Power: The Ultimate Placebo Effect* (Prometheus Books), provides a concise examination of crystal claims. Jay Kinney goes over current political conspiracy theories and the Theosophist Society. Kinney, by the way, is a former editor of *Whole Earth Review* and several excellent underground comic books, as well as the founder and editor of *Gnosis* magazine. Robert Anton Wilson contributes an examination of the various definitions of "truth" in the guise of an amusing "true or false" quiz.

Charles Tart outlines the issues of parapsychology, followed by a piece by Susan Blackmore giving the reasons she is no longer as much a believer in psi as she once was. There are lengthy essays on flat-earth theories, flying-saucer religions, the "Men in Black," and William Corliss's "Sourcebook" project. Skeptical books are represented alongside pro-paranormal texts, with extensive commentary; there's even a special section for skeptical books, such as James Randi's *Flim-Flam!* and *The Faith Healers,* Martin Gardner's *Science: Good, Bad and Bogus* and *The New Age,* Laurie Godfrey's *Scientists Confront Creationism,* and George Abell and Barry Singer's *Science and the Paranormal.*

The sections on trance-channeling and modern shamanism are probably the most enlightening for skeptics; these two subjects are not usually submitted for scientific scrutiny, and they are likely to be dismissed as primitivism or charlatanry without proper investigation. Editor Ted Schultz's essay on channeling outlines what is already known about the mind that may give rise to behavior commonly described as "possession" or "channeling," such as alternate personality theories, the ability of many individuals to perform two unrelated chores simultaneously, cryptomnesia (recalling something long-forgotten, but believing it to be an original thought), and psychological dissociation of subpersonalities within the individual.

Chas Clifton adds an amusing essay on how the recent wave of "shamanism" in America differs from its cultural precedents, in "Armchair Shamanism: A Yankee Way of Knowledge." Clifton goes over Richard de Mille's investigations of Carlos Castaneda's books, and Clifton's amusing estimate of Lynn Andrews (*Jaguar Woman, Medicine Woman*) bears repeating:

> More accessible than Castaneda, ready to leap into lecturing and producing tape cassettes, Andrews writes novels that bear the same relationship to traditional shamanism that Harlequin Romances bear to a solid, enduring marriage. Instead of the poor but honorable working girl who marries the moody lord or rising businessman, they feature Lynn the butterfly shaman and her magic carpet of credit cards. She books flights to one exotic location after another—northern Canada, the Guatemalan jungle, the Australian outback. No sooner does she arrive than she discovers women possessing ancient secrets who scarcely meet the blonde stranger before they fall all over themselves offering her one dizzying initiation after another.

The book also provides a reprinting of the most thorough debunking of the "Hundredth Monkey" legend. The first is Ron Amundsen's article from the SKEPTICAL INQUIRER (Summer 1985), illustrated by Norman Dog. The second is a rebuttal by author Lyall Watson, whose book *Lifetide* was the original source of the myth. (I only wish the book might have reprinted Amundsen's reply to Watson, which also appeared in *SI,* Spring 1987.) But the most devastating critique of the story comes from psychologist Maureen O'Hara, who points out that the story's moral (that if enough people believe in something, it becomes "true" for the rest of the population through a group-mind communication) is

> a betrayal of the whole idea of human empowerment. . . . Individuals no longer have any obligation to develop their own worldview within such a collective—it will come to them ready-made from those around. . . . This is not a transformational myth impelling us toward the fullest development of our capacities, but one that reduces us to quite literally nothing more than a mindless herd at the mercy of the "Great Communicators." The myth of the Hundredth Monkey Phenomenon is more chillingly Orwellian than Aquarian.

Not all of the book's New Age focus is on paranormal claims. There is a dandy piece of journalism on the Airplane Game, a Ponzi-like money-making con game that has gained popularity in the New Age movement. Clothed in "workshopping" and "community" sales pitches, the Airplane Game designates a hierarchy of one pilot, two co-pilots, four flight attendants, and eight passengers. Each level pays $1,500 to the next higher level; the pilot "jumps out" after collecting $12,000, and the plane splits into two, with two new "pilots." The game is sold as a way of parlaying a small investment into a nearly eightfold return, but the mathematics show differently; for the eight people at the bottom to "pilot out," they'd have to recruit 64 newcomers, who in turn would have to recruit another 512 people, who in turn—well, you get the idea. Usually, the games die out after the first few "pilots" make off with their payoffs. (This con game is not native to New Agers; recently, the same scheme was working in Philadelphia under a "black pride" aegis.)

The Fringes of Reason has only two flaws, but I regard them as major; and, oddly enough, both involve the same contributor, Jerome Clark. The first problem is in the section on UFOs. While several skeptical books are reviewed, with excerpts, none of the essays are by critics of UFO claims. This is not to say that the articles are uniformly pro-UFO; John Keel's "The Man Who Invented Flying Saucers" is an amusing profile of Ray Palmer, who popularized the UFO stories of the 1940s and 1950s. There are excerpts from Douglas Curran's *In Advance of the Landing,* a collection of photos and essays about the popular culture that has sprung up around the saucers.

But the articles addressing specific claims (crashed saucers, abductions, and the

like) are written from a pro-UFO view. The section as a whole gives the impression that UFO debunkers are merely naysayers opposing "overwhelming" evidence. As a result, in his essay on crashed-saucer claims, Jerome Clark can write without contradiction that the MJ-12 documents "[have] not been successfully debunked (despite some frantic efforts by veteran UFOphobe Philip J. Klass . . .)." I don't think that Klass would appreciate being characterized as a frantic UFO*phobe,* but he doesn't get a chance to respond. This is a shame; the book deserved to have at least one Klass debunking, if only as an example of how many UFO claims dissolve into fantasy under a really thorough investigation.

The second flaw is a reprint of Clark's article in *Omni* magazine, "Censoring the Paranormal." This essay is notorious among skeptics for its use of misleading and inaccurate reportage to defame the aims and methods of CSICOP. One paragraph, for example, incorrectly describes a particular Philadelphian as "one of their [CSICOP's] number" and quotes from one of his mailings, encouraging the use of "any means short of breaking the law" to "get the point across to people who have no demonstrated ability to reason."

I am an organizer of the Delaware Valley Skeptics, based in Philadelphia, but I have not yet encountered this person, nor anyone who remotely shares his deplorable view. I think I'm justified in feeling a bit slighted by having these reprehensible tactics linked to Philadelphia skeptics. (In all fairness, the essay was written before this group had organized, but a phone call to CSICOP to confirm the essay's claims would have disclosed the facts.)

Similarly, CSICOP had severely criticized the mailing in correspondence with this individual, as well as explaining the situation to *Omni* magazine in a subsequent letter of protest. It was made clear to both *Omni* and Clark that this individual did not speak for or on behalf of CSICOP. Yet, Clark allowed the article to be reprinted in *The Fringes of Reason* without a correction or a reply from CSICOP.

But these flaws are slight compared with the worthiness of the rest of the book. I wish it could have been longer, with more critical stuff on UFOs, more detail on the history of parapsychology, and more recent history of the New Age movement. But the book is a cornucopia to begin with, and as it stands, it is still an indispensable overview of fringe beliefs and trends of the 1980s. •

Guerrilla Ontology and Factoids in Action

The New Inquisition: Irrational Rationalism and the Citadel of Science. By Robert Anton Wilson. Falcon Press, Phoenix, Ariz., 1987. 240 pp. Paper, $9.95.

Robert Sheaffer

THERE IS a "New Inquisition" loose in the land, says Robert Anton Wilson, coauthor of the *Illuminatus* trilogy, author of *Cosmic Trigger, Schroedinger's Cat,* and many other works, a witty man who has a virtual cult following.

The group allegedly suppressing dissent to preserve its orthodoxy is what Wilson calls the "Citadel" of science, by which he means what some people call the "military-industrial complex." He depicts this as an unholy alliance of scientists and government-sponsored defense firms, universities, and laboratories, whose job it is to devise more efficient ways to murder people. He calls the doctrine of these closed-minded and wicked people "fundamentalist materialism." And the inquisitors doing the dirty work of this sinister group are those whose names you see on the inside cover of this magazine, for to Wilson CSICOP represents the very head of materialist wickedness, the apex of the sinister pyramid. "One does not have to be a dogmatic Marxist to . . . wonder if the priests of the Citadel have a *vested economic interest* in supporting the axioms of their employers and of imperialist-materialist philosophy in general." Wilson sees the scientific world-view as a form of Western "mental imperialism," a means by which selfish and greedy white males oppress women and non-Western peoples. (Try convincing the people of modern-day Japan, Taiwan, or Singapore that science is an arbitrary expression of a Western world-view!)

Conspiratorial thinking comes naturally to Robert Anton Wilson, probably the world's leading yarn-spinner about vast global conspiracies. Elsewhere he has suggested halfway in jest—although apparently *only* halfway—that a sinister conspiratorial organization such as the secret *Illuminati* really might be controlling the unfolding of history. If it is not the Illuminati, then it may be the bankers of the Vatican and/or the Knights of Malta, some of whom may have had something to do with the assassination of John Kennedy, or the sudden death of Pope John Paul I. While some people see history as driven by technological developments, and others by economic forces or social classes, Wilson sees a conspirator hiding behind every Bush (who is, of course, a Trilateralist).

Do not mistake Wilson for a Marxist. He poses as an anarcho-libertarian, although of a very weird kind. (How many libertarians approve of a guaranteed annual wage?) Indeed, it is this very weirdness that so delights his fans. Wilson practices what he calls "guerrilla ontology," a technique similar to Charles Fort's practice of peppering the reader with an unending stream of bizarre and outrageous but highly entertaining claims, some of which are plausible, while others are so bizarre that you would have to throw out much of your brain to make room for them. Wilson announces quite candidly that not everything he says is to be taken seriously, but leaves the

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Robert Sheaffer's latest book is Resentment Against Achievement *(Prometheus Books).*

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reader to guess which parts *are* and which are not. One suspects that he has not answered the question himself and that anyone who attempted to pin him down about it would be denounced as humorless.

He regales us with tales of Fortean "Fafrotskies" (things that allegedly fall from the skies), and a yarn about a man who thought he was a dog, taken from a tabloid whose current headline reads: "Space shuttle was invaded by aliens." Should you catch Wilson in an embarrassing howler, he just laughs at you, hinting that the part you object to was not *supposed* to be taken seriously. Apparently Wilson operates on the principle that all claims should be treated as equal, whether prosaic or bizarre, and that only the dogmatic discriminate against something merely because it makes no sense. If you doubt literal sightings of a centaur, it is only because you are blinded by the conventions of your "reality tunnel." Tune in, turn on, and believe all manner of things; you might even see a "man with warty green skin and pointy ears, dancing," as Wilson did on the day following one of his "trips" on peyote (*Cosmic Trigger,* 1977).

The surprising thing about such a wild and woolly book by a free-shooting author is that there is actually quite a sophisticated understanding of philosophy behind it. Wilson has gone far beyond the freshman-level philosophy some authors employ to create a veneer of wisdom, who pull a few overused and largely irrelevant quotations. Wilson reveals a knowledge of many philosophers, but especially Nietzsche. In this book of 240 pages, I counted 31 separate references, direct or implicit, to Nietzsche or Nietzschean thought. (There is, alas, no index.) Wilson displays an excellent knowledge of Nietzsche, and not the caricature of Nietzsche popularly imagined to embody a supreme wickedness, but of Nietzsche the serious epistemologist. Wilson has clearly stumbled on the little-known twentieth-century shortcut for being proclaimed a genius: Drink deeply from the fountain of Nietzsche, and spew back some portion of it, in a form vastly easier to understand. Among the others making this discovery were Sigmund Freud, H. L. Mencken, Ortega y Gassett, Eric Hoffer, Jean-Paul Sartre, and Ayn Rand.

Wilson expounds the Nietzschean notion of the inexhaustible richness of reality, with the accompanying impossibility of ever reducing it to any single observational paradigm. He also employs the Nietzschean notion of language as "metaphor," whose roots he quite plausibly traces to Emerson. This, of course, poses a formidable difficulty to anyone who might want to claim absolute and certain knowledge of the "nature of things" based on observations, a claim he imagines CSICOP to make. Wilson stresses the need for continual Nietzschean "self-overcoming" of one's own limitations and prejudices. He repeats Nietzsche's pronouncements of the need for continual skepticism of accepted ideas, and of the dangers of blind belief.

Another philosopher Wilson brings in to support his position is David Hume. He correctly explains Hume's demonstration of the impossibility of ever arriving at certain knowledge of causality from observations of objects in the physical world. Again, he imagines that CSICOP claims absolute and certain knowledge of cause and effect, that professional philosophers like Paul Kurtz, Antony Flew, Paul Edwards, and Sidney Hook are unaware of Hume's critique, and that a few well-known quotations from Hume will stop CSICOP dead in its tracks. Wilson sails on, blissfully unaware that his beloved David Hume wrote what is probably the most devastating work of hard-nosed debunking in the entire history of philosophy. Hume's essay "Of Miracles," in *An Enquiry Concerning Human Understanding,* urges that claims of alleged paranormal occurrences be viewed with the maximum possible suspicion. Since "the knavery and folly of men are such common phenomena,"

Hume concludes that "no testimony is sufficient to establish a miracle, unless the testimony be of such a kind, that its falsehood would be more miraculous, than the fact, which it endeavours to establish; and even in that case there is a mutual destruction of arguments." Thus while Wilson thinks that Hume's critique of empirical certainty should lead us to welcome with open arms any and all yarns about miraculous events, Hume himself thought it implied one should toss out the window all claims of the miraculous that are supported by testimony alone.

A similar irony occurs when Wilson confronts the thought of the noted physicist John Archibald Wheeler, whose "multiple universe" interpretation of quantum mechanics seems to Wilson to make psychic happenings and "non-local connections" a virtual certainty. What Wilson either doesn't know, or doesn't tell us if he does, is that Wheeler himself vehemently disagrees. Wheeler terms parapsychology "a pretentious pseudoscience" that was given undeserved recognition by the AAAS during the 1960s "decade of permissiveness" (*SI,* vol. 3, no. 3, Spring 1979, p. 3). Wheeler publicly called for the Parapsychological Association to be ousted from the AAAS unless it could come up with a repeatable experiment within one year.

Similarly, Wilson discusses physicist Murray Gell-Mann, the Nobel laureate and CSICOP Fellow, whose theory of quarks Wilson tries to link with psychic phenomena. Once again, Wilson seems not to know that Gell-Mann has sharply criticized the very thing he is doing and insists that quantum mechanical theory is *not* compatible with alleged "psychic effects" (*SI,* vol. 11, no. 1, Fall 1986, p. 9). It is really quite funny how Wilson keeps trying to enlist the most hardened skeptics as allies in his crusade for crackpottery.

James Randi, as depicted by Wilson, is a pig-headed man who keeps his head buried in the sand. Each time Randi hears talk of something that "shouldn't" be, he just waves his arms and shouts to his followers that "it can't be," and they, like the blind fools they are, believe him. Wilson's insipid analysis of the Randi-Geller-SRI matter, in its entirety, is this: "See especially the interminable diatribes of CSICOP's James Randi against Drs. Puthoff and Targ, physicists of Stanford Research Institute (Palo Alto [actually Menlo Park]) who allowed Uri Geller into their laboratory and then reported that which Mr. Randi, who was not there, *knows* passionately could not have happened." This not only grossly misrepresents Randi's methodology, but indicates that Wilson knows nothing about Randi's investigation of Geller. If Wilson, before writing this diatribe, had bothered to read, or even peruse, Randi's *Flim-Flam* or *The Truth About Uri Geller,* he would have known how Randi had dogged Geller's trail over a period of years, and how Geller's deceptions were gradually revealed, despite Targ and Puthoff's inexcusable refusal to cooperate with other investigators. But "guerrilla ontologists" do not share our bourgeois prejudice for getting facts straight before writing them; like all terrorists, the intention is to destroy, not to build, in this case the target being not people, but knowledge.

Wilson trips himself time and again over the simplest matters, and not only in this book. Given the superficial level of his research and his apparent refusal on principle to verify facts before they are published, his writings turn into a wonderland of witty erudition mixed with elephantine blundering. While his books are beyond any doubt marvelously entertaining, they are strewn with "factoids": statements that appear to be reliable, but are really anything but. In one revealing example, Wilson quotes from a SKEPTICAL INQUIRER article by Professor Mario Bunge: "Likewise telepathy may be a fact after all—though not clairvoyance, precognition, or psychokinesis, all of which conflict with basic physical laws." The first difficulty is that Bunge is pummeled throughout Wilson's book under the name

of "Professor Munge." Wilson's comment on this passage is: "Leaving aside Prof. Munge's odd tolerance about telepathy—Black Heresy to get printed in *that* journal!—note well what his sentence says and what it implies. It seems to me that it implies that he already knows all the laws of the universe, or all the *important* ones, and that is what I mean by a huge and audacious faith."

It is a pity that Wilson did not read the article immediately following that one, by Professor Stephen Toulmin, who disagrees sharply with Bunge. Toulmin's article is summarized: "The task of demarcating between the real sciences and pseudoscience has had a long and complex history. That history should induce a certain modesty." In it, Toulmin emphasizes the difficulty of distinguishing between science and pseudoscience, and warns against hasty judgments. But such "heresy" couldn't possibly be published in the SKEPTICAL INQUIRER, Wilson would insist, because that would make CSICOP a "Liberal Materialist" organization, a kind of which he would approve. The articles by Bunge and Toulmin are both derived from talks given at the 1983 CSICOP conference, and during his talk Toulmin hurled some extremely sharp verbal barbs at Bunge, who had spoken earlier. If Wilson had attended this conference, or listened to the tapes of it before writing his critique, he would have learned that his so-called inquisition not only permits wide-ranging discussion and dissent, but actively seeks out divergent scholarly opinions to invigorate its proceedings!

It occurs to me that if Wilson had actually *read* the issue of *SI* in which Bunge's article appeared (vol. 9, no. 1, Fall 1984), he might have gotten the author's name right. He *might* even have turned to the article immediately following it, and realized that authors published in *SI* do not automatically agree with each other like robots in lock-step, although the existence of diversity among rationalists being so far outside Wilson's "reality tunnel," he would probably fail to recognize it even if he did. Thus, Wilson writes a book attacking an organization whose publication he has scarcely read, accusing it of the "crime" of criticizing what it does not understand, while himself having absolutely no comprehension of what that organization is really like, or of the diversity of opinion it encompasses. CSICOP as described by Wilson bears absolutely no resemblance to the CSICOP I have known for more than ten years.

Of my book *The UFO Verdict,* Wilson says: "Mr. Robert Sheaffer of CSICOP has recently written a book called *The UFO Verdict.* I have not read it and therefore do not presume to criticize it, but I cannot help noticing the classic Fundamentalism of the title. A muddle-head like myself cannot even put together a plausible UFO *theory* yet (not even to my own satisfaction), but Mr. Schaeffer [*sic*] has a *verdict.*" Wilson deduces, having never met me, nor even read my book, that I am suffering from "the Right Man syndrome," the inability to even consider the possibility that I might be wrong. He cites a sociologist's paper, *Report on the Violent Male,* and goes on to describe the circumstances in which Right Men like me become violent. CSICOP, he infers, is filled with Right Men like that, who fight "as dirty as possible." You can imagine how relieved I was to learn that "not all Right Men become criminals." Here we can clearly see the Wilsonian methodology in action: Grab a tiny piece of a fact, or something that resembles one, and puff it up and stretch it mightily until it begs for mercy. Accuse those you disagree with of being wicked and violent persons. If they object to this procedure, vehemently accuse them of hidebound dogmatism, and dump a dozen more factoids on their heads.

Many crocodile tears are shed over the fate of poor old Dr. Wilhelm Reich, the bizarre neo-Freudian psychologist who believed he had discovered "Orgone energy," the hidden cosmic energy of the orgasm, which makes the sky blue. Wilson

tries to convince the reader that Reich was arrested by agents of the Citadel because of his scientific and political "heresy," and his books suppressed. He blames Martin Gardner for leading the "propaganda war against Reich." Wilson thinks that the burden of proof is upon any skeptic who questions Reich's bizarre experiments: Until Martin Gardner repeats these same experiments, he has no grounds to doubt them. What Wilson won't tell you is that Reich was arrested for defrauding sufferers by pretending to cure cancer and other diseases through "orgone energy" therapy. The government rightfully takes a dim view of those who exploit sick people by selling them fraudulent "cures." While the court, upon Reich's conviction, destroyed an inventory of his books, his works were not, and are not, actually suppressed or banned: "New Age" bookstores are filled with them.

Wilson rides a similar hobby-horse about the alleged persecution and silencing of Immanuel Velikovsky: "The Citadel didn't burn his books, but they tried." What the reader isn't told is that Velikovsky's pseudoscientific work was going to be published as a *textbook,* which naturally upset those scholars whose textbooks had already been published by the same company. In any case, a *boycott,* no matter how ill-advised, falls far short of an inquisition!

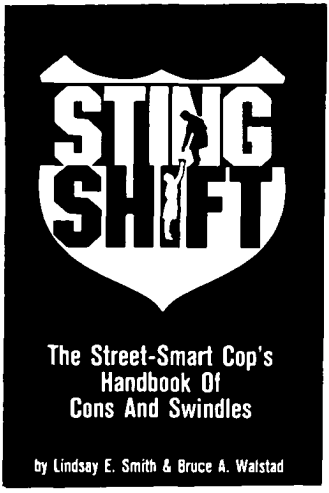
Wilson admits directing "much wicked sarcasm" at CSICOP for its defense of "the Citadel." There is one major element of Nietzschean thought that Wilson unfortunately does not seem to understand. Nietzsche warned against an attitude he called *ressentiment,* which he defined as habitual, spiteful revengefulness against persons or institutions that are influential or successful. For all his erudition in Nietzsche, it is odd that Wilson does not recognize the *ressentiment* in his own rage against the power and prestige scientists have earned by their accomplishments. More philosophy for Wilson to ponder: Kierkegaard wrote, "Envy will hasten to his dark corner whence he will summon his even more hideous cousin, malicious glee." *The New Inquisition* is a book filled with "malicious glee." The so-called heretics Wilson seeks to defend within it are not worthy of the now-honored title "heretic." The heretics of old were prosecuted because they dared speak out freely against orthodoxies. Today's so-called heretics unquestionably have that freedom: Everyone concedes this, and they can be found exercising this freedom every day of the year. But what Wilson and others actually seek for today's heretics is *exemption from critical examination of their claims.* As long as I have *my* freedom of speech, I intend to see that they do not get it.

Thus, the poisoned arrows of *The New Inquisition* widely miss their mark because Wilson doesn't really know where his target is. This superficial critique, envenomed by envy and personal attacks, and apparently written in great haste, will delight those whose minds, like Wilson's, are inflexibly made up, who love seeing the "bad guys" take a licking. But to the thoughtful person who does not see the world in Wilsonian conspiratorial terms, this book contains no useful critique of CSICOP or of materialism, "fundamentalist" or otherwise. I would love to see Randi and Wilson match wits publicly, perhaps at some future CSICOP conference. While both men are justly famed for their ability to dazzle audiences, I fully expect that Wilson would end up with egg on his face, embarrassed by the shallowness of his knowledge of those he attacks. Wilson does not even realize that the "Liberal Materialism" of which he claims to approve—to pronounce judgment only *after* investigation—has been the policy of those he brands "Fundamentalist Materialists" for as long as CSICOP has existed. For that reason, *The New Inquisition,* despite all its thunder and lightning, is worthless as a thoughtful critique of the skeptical movement. •

Bunco—Read All About It!

Sting Shift: The Street-Smart Cop's Handbook of Cons and Swindles. By Lindsay E. Smith and Bruce A. Walstad. Street-Smart Communications, Littleton, Colo., 1989. 125 pp. Paper, $19.95.

Robert A. Steiner



STING SHIFT was written for law-enforcement professionals as a guide to investigating con-games. However, the general public would also be well advised to become aware of these scams. Awareness contributes significantly to protection.

Authors Lindsay Smith and Bruce Walstad are experienced magicians. They bring to the topic a wealth of experience in trained observation and investigation. Walstad, who has been in law enforcement for 13 years, gives presentations to law-enforcement professionals on bunco investigation and on educating the public.

The reader will find a comprehensive overview of a wide variety of cons. They run the gamut from "Cons and Swindles: Street of Schemes" to "Twisting Satan's Tail: Cults and Crimes in the World of Darkness." Along the way they pass through "UFOs, 'Bigfoot' and Other Hoaxes" and "Fortune Tellers, Faith-Healers and Other Fun Folks."

Without wasting words, the authors go directly to the heart of the crimes they expose—make that the jugular; "heart" is inappropriate in referring to con-games. For example: "Psychic surgery is nothing more than sleight of hand using magic props, animal tissue and blood, and some good acting."

Another example addresses the claims of "psychics" that they help the police: "Paul Kurtz, professor of philosophy at the State University of New York at Buffalo and chairman of the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) . . . says, 'There is no hard data that self-proclaimed psychics have been able to help detectives in unearthing criminals or lost persons.' "

The crimes of some satanic cults are treated as if they were different from the other criminal activities covered in this book. The authors exhibit a mystical, almost religious awe of the perpetrators of these crimes. But my concern about this is dwarfed into insignificance in light of their professional, forthright analysis of an entire panorama of criminal behavior. Ranging from exposés of cold readings to warnings against hiring the passing truck driver to black-top your driveway, this concisely written book is a virtual encyclopedia of con games.

The authors toss off in one magnificent sentence a reply to a philosophical challenge that skeptics have been struggling with for years: "Well, maybe it doesn't work.

Robert A. Steiner is a Fellow of CSICOP, national president of the Society of American Magicians, on the board of directors of the National Council Against Health Fraud, and a member of the National Association of Bunco Investigators.

But how can you be sure? Isn't it worth a try? What harm can come from trying it? I'll try anything once."

In half a page, most of us could do a credible job of rebutting the above. Would you like to try it in 15 words or less? If you would, you may want to adopt Walstad's analysis: "There are safer ways to test for poisonous chemicals than by tasting them."

The concluding chapter is "Educating the Public: A One-Hour Community Relations Presentation." While this is targeted for the law-enforcement professional dealing with con games, the guidelines are universally applicable. Topics include: identifying the audience, planning your presentation, questions from the audience, visual aids, basic presentation outline/cue sheet, and more.

Were this book devoid of practical value, I would still enthusiastically recommend it for its interest and entertainment value. But it is much more. It is an informative exposé that affects your financial and emotional well-being. This is your blood and guts you are reading about.

You will be spellbound by its intrigue, fascinated by the devious methods used to strip people of their money, and terrified by the knowledge that money is not the only thing the victims may lose. Their self-esteem, their health, and even their very lives can be lost to the con games.

I highly recommend *Sting Shift* for your reading enjoyment, for your information, and for your life-saving protection. •

Some Recent Books

Jerome, Lawrence E. *Crystal Power: The Ultimate Placebo Effect.* Prometheus Books, Buffalo, N.Y. 195 pp. $18.95, cloth; $12.95, paper. Perhaps the first book examining claims of crystal-power proponents from a scientific point of view. Jerome conducted three experiments of his own, involving gas mileage, water purity, and marigold-growing rates, to determine if using crystals had any effect (it did not) and conducted a national survey of crystal advocates. The results indicate that any powers are not in the stones but in the imagination of the believers.

Myers, David G. *Psychology,* 2nd Edition. Worth Publishers, Inc., New York, 1989. 623 pp. + glossary, references, indexes. $36.95, cloth. New edition of psychology textbook is one of few texts to include treatment of psychological issues involved in paranormal-type beliefs. The chapter on perception includes a section titled "Is There Perception Without Sensation?" which discusses claims of ESP and skepticism about ESP, including subsections on "Premonitions or pretensions?" and "The mystique of ESP." The chapter on states of consciousness also has much relevant material, including sections on hypnosis and on near-death experiences.

—*Kendrick Frazier*

Articles of Note

Asimov, Isaac. "The Moon and We." In Asimov, *The Relativity of Wrong,* Pinnacle/ Windsor Publishing Co., New York, 1989, pp. 117-132. Essay critically examines arguments that the moon affects human behavior, particularly the assumption by many of a connection between the moon and women's menstrual periods. Shows persuasively that this is not the case.

"Astrology and Astronomy." Astronomical Society of the Pacific (390 Ashton Ave., San Francisco, CA 94112, $4.00). Booklet reprints half a dozen recent articles by compiler Andrew Fraknoi and other astronomers and psychologists critically analyzing astrology, plus "Examining Astrology: An Introductory Bibliography."

Bauer, Henry H. "The Velikovsky Affair." *La Recherche* (France), No. 205, pp. 1448-1455, December 1988. (An English-language text is available from the author, Dept. of Chemistry, Virginia Polytechnic Institute and State University, Blacksburg, VA 24081.) Useful reexamination of the Velikovsky affair, by the author of a 1984 book on the subject. Substantively, the Velikovsky affair "is finally dead and past," yet it remains instructive as an illustration of the "two cultures" of C. P. Snow: "Too many nonscientists were too gullible toward Velikovsky's scientific statements and pretensions. . . . In retrospect, it seems difficult to believe that any significant group of educated people should have given credence to Velikovsky's assertions having to do with physical science." Nevertheless, he feels that something like the Velikovsky affair could happen again, "for all the necessary ingredients are present."

Beyerstein, Barry L. "What Ever Possessed You? . . ." *Contemporary Psychology,* vol. 34, no. 4, 381-382, 1989. Critical review of Jon Klimo, *Channeling: Investigations on Receiving Information from Paranormal Sources.*

Bird, Elizabeth. "Invasion of the Mind Snatchers." *Psychology Today,* April 1989, pp. 64-66. Anthropologist reports on recent alien-abduction claims. Points out that "most psychologists agree that such tales spring not from the alien world of extraterrestrials but from the dark interior world of the human psyche." Draws on papers by Robert Baker, Bill Ellis, and Milton Rosenberg in emphasizing the processes of confabulation and fantasy-prone personalities.

Blackmore, Susan. "Consciousness: Science Tackles the Self." *New Scientist,* April 1, 1989, pp. 38-41. Report on new light that neuroscience research is shedding on the longstanding philosophical enigma, the nature of "self."

Bower, Bruce. "The Strange Case of the Tasaday." *Science News,* 135:280-283, May 6, 1989. Report on whether these were indeed primitive hunter-gatherers or phonies. Opposing sides in the scientific dispute still have reached no consensus.

Brunsman, Barrett J. "Ghost Story: Reporting on the Haunted House of Horicon." *The Quill,* April 1988, pp. 25-30. A report on the varied responses of the media to a supposed haunting in Horicon, Wisconsin. Brunsman also discusses the broader question: How does a responsible journalist report sensational claims?

Clancy, Frank, and Heidi Yorkshire. "The Bandler Method." *Mother Jones,* February-March 1989, pp. 22-28, 63. Investigation into the case of New Age therapist Richard Bandler, cofounder of Neuro-Linguistic Programming (NLP), and his 1986 arrest for murder. He was subsequently acquitted, but the authors say Bandler's story "is, in a sense, a parable of the New Age. Having rejected many of the boundaries that govern relations among people, he was like a sailor without anchor or sails, adrift in a peculiarly New Age sea. . . . Morality was relative."

Fry, Stephen. "Whines and Spirits." *The Listener,* December 8, 1988, p. 17. A blistering and sarcastic attack on ghosts, clairvoyance, astrology, etc. "It's extremely unlucky to be superstitious, for no other reason than it is always unlucky to be colossally stupid."

Gardner, Martin. "Glossolalia." *Free Inquiry,* Spring 1989, pp. 46-48. Provides history and a look at current revival of glossolalia, or "speaking in tongues," the stream of unintelligible sounds spoken in a state of religious exaltation. Among Protestants and Catholics in the United States a longstanding rift has been widening between those who promote the practice as a miraculous gift of God and those who are appalled by it. Anyone can do it, Gardner reports; he himself began to practice tongue speaking while researching the article. "I . . . now can babble it fluently," he writes.

Gardner, Martin. "Guest Comment: Is Realism a Dirty Word?" *American Journal of Physics,* 57(3): 203, March 1989. Insightful critical commentary on the view among a few physicists, especially those influenced by New Age thinking and "what they fancy certain Eastern religions say"—that reality is an invention of the human mind and does not exist outside of us. Gardner refutes that notion and gives several examples of familiar observer-dependent phenomena (rainbows, reflections in mirrors) that nevertheless are not human-dependent (unmanned cameras record them admirably) and that do not imply an absence of a well-defined structure of nature responsible for them.

Hövelmann, Gerd H. "Animal 'Language' Research: The Perpetuation of the Same Old Mistakes?" *Semiotica,* 73(3/4): 199-217, 1989. Slightly revised version of author's presentation at CSICOP symposium on animal language in Pasadena in April 1987. Concludes: "Today, animal language research appears to be both hardly further advanced and hardly more successful than it was some 75 years ago. In spite of (mostly strong) claims to the contrary, animal language research . . . . has taught us far less about higher intellectual capacities in the animal (for which proponents of animal language have yet to provide the first piece of convincing evidence) than about the fallibility of man."

Hyman, Ray. "The Psychology of Deception." *Annual Reviews of Psychology,* 40:133-154, 1989. An overview of the psychology of deception with sections on historical approaches (Jastrow; Dessoir and Binet; and Triplett), the contemporary scene, categories and examples of deception (nonhuman deception, children and deception, psychic fraud, and other cases), and borderline and related cases (Piltdown man, con games).

Karns, Daryl R., and Jeffrey Brune. "The Hoaxbusters." *Science World,* May 19, 1989, pp. 6-8. Readable report for junior high science students on CSICOP and some of the investigations published in *SI* (Tina Resch's "poltergeist," firewalking, etc.). "They won't be 'slimed' by tales of ghosts, UFOs, and alien babies. . . . These hoax hounds demand scientific evidence."

Lamal, P. A. "Attending to Parapsychology." *Teaching of Psychology,* 16(1): 28-

30, February 1989. Notes that most introductory psychology textbooks (20 out of 28 published between 1984 and 1988) ignore parapsychology, despite the widespread belief and interest in it. Discusses the psychological literature available to textbook writers interested in "attending to parapsychology" and suggests that many standard topics of psychology are related to parapsychology, both in teaching about psychology and in doing research about the teaching of psychology.

Lewin Roger. "The Case of the 'Misplaced' Fossils." *Science,* 244: 277-279, April 21, 1989. Detailed report on the case of a paleontologist from India, V. J. Gupta, who for 20 years has inundated the geological and biogeographical literature of the Himalayas with "a blizzard of disinformation so extensive as to render the literature almost useless." An Australian scientist who has examined this work on ancient Himalayan geology alleges that it "may be the greatest paleontological fraud of all time." Gupta drew in many experts worldwide to collaborate with him on reports on fossils whose Himalayan origin is now highly suspect. See also Talent's article in *Nature,* 338:613, 1989.

McCarter, James. "Give Me That Old Time Religion." *The Spectator,* December 24/31, 1988, pp. 22-23. A skeptical report on a British meeting of the Raelian Movement, and a brief interview with "Rael" (Claude Vorilhon), who claims that humanity was created by extraterrestrials.

Nelson, Merlin V. "Health Professionals and Unproven Medical Alternatives." *Journal of Pharmacy Technology,* March/April 1988, pp. 60-69. Professor of pharmacy reviews unproved medical alternatives: acupuncture, auriculotherapy, biofeedback, cellular therapy, chelation therapy, chiropractic, colon therapy, faith healing, hair analysis, herbal medicine, holistic medicine, homeopathy, hypnosis, iridology, naturopathy, nutrition quackery, orthomolecular medicine, and unproved cancer remedies. These "have been promoted without adequate scientific evidence to support their usefulness or safety." Extensive references.

Nickell, Joe, and John F. Fischer. "Did Jack Angel Survive Spontaneous Combustion?" *Fate,* May 1989, pp. 80-84. Reexamines 1974 case of Georgia traveling salesman who suffered severe burns that writer Larry E. Arnold in 1982 attributed to spontaneous human combustion. In fact, records of Superior Court for Fulton County, Georgia, show that Angel had been scalded by high-pressure hot water from his motor home's water heater; he even filed suit against the motor-home manufacturer seeking damages. Furthermore, the medical findings, physical evidence at the scene, and statements of other involved persons "establish that Jack Angel was accidentally self-injured by a scalding, pressurized jet from his motor-home's hot water system—not by spontaneous combustion."

"NYASk." *New Yorker,* May 29, 1989, pp. 30-31. "Talk of the Town" informal report on a meeting of the New York Area Skeptics (NYASk), featuring a talk by Philip J. Klass on UFOs. "The New York Area Skeptics turned out to be some of the most sensible people we'd ever met," says the author (Mary Norris). Also reports briefly on CSICOP and *SI,* listing dozens of topics subjected to scrutiny in these pages.

Randi, James. "Your Health: Exposing Fraud Isn't Magic." *Modern Maturity,* June-July 1989, p. 22. One-page call to action. Summary: "Beware the quack bearing news of the latest 'cure.' "

Rogers, Michael. "The Follies of Science." *Newsweek,* May 8, 1989, p. 56. One-page report on incidences in science of "wishful science," where researchers reported what they wanted to find (N-rays, the Allison effect, mitogenic rays,

polywater, the British Zeta fusion claims of 1958, etc.). Part of the magazine's cover report on the cold fusion controversy.

Rojciewicz, Peter M. "The 'Men in Black' Experience and Tradition: Analogues with the Traditional Devil Hypothesis." *Journal of American Folklore,* April-June 1987, pp. 148-160. A scholarly comparison of the "Men in Black" (MIB) thread of UFOlogy with devil traditions and eastern folklore.

Schrock, John Richard. "Pseudoscience of Animals and Plants." *Kansas School Naturalist* (Emporia State University, Emporia, KS 66801), 35(4): 1-16, April 1989. Entire issue subtitled "A Teacher's Guide to Nonscientific Beliefs." Excellent guide by biologist (and member of CSICOP's Education Subcommittee) to help teachers and students distinguish science from pseudoscience. Includes classroom strategies, a suggestion to do lab and field studies, and some case examples. Also presents "Twenty 'Science Attitudes' " modified from Bronowski, Diederich, and Whaley and Surratt.

Soyfer, Valery N. "New Light on the Lysenko Era." *Nature,* 339: 415-420, June 8, 1989. Extensive report based on previously unpublished material shows how Trofim Lysenko both deceived and won support for his untenable theories and thereby destroyed genetics in the Soviet Union.

Starr, Douglas. "Levitation U." *Omni,* May 1989, pp. 66-72, 119. Detailed report on Maharishi International University in Iowa, including the claims of teaching levitation and the "Technology of the Unified Field" ("considered absurd by many mainstream physicists"). Includes report on how MIU scored a recent coup with publication of a research paper in the peer-reviewed *Journal of Conflict Resolution,* claiming positive results in reducing violence in Israel and Lebanon during mass meditation. Many comments pro and con are quoted.

Synodinos, Nicholaos E. "Review and Appraisal of Subliminal Perception Within the Context of Signal Detection Theory." *Psychology & Marketing,* 5(4):317-336, Winter 1988. Traces origins of subliminal perception controversy and summarizes and evaluates studies. Finds that only when awareness is defined with subjective criteria is "subliminal perception" a valid, demonstrated phenomenon. When an objective definition is adopted and proper psychophysical methods are allowed, "there is no support for the effectiveness of undetectable stimuli." Furthermore, the literal use of the term *subliminal* is unwarranted.

Thorn, Patti. "Tabloid Tales! Believe It or Not! The Truth Behind Claims Is Truly Sensational." Scripps Howard News Service, June 23, 1989. (The particular head quoted was in the *Albuquerque Tribune*). A fascinating investigation into whether sensational stories in supermarket tabloids are true or not. The reporter picked three recent stories and tried to track down the people mentioned to verify the claims. For one, "70-year-old Woman Bears Child!" the reporter, with help from French-speaking colleagues, could find no record of this mother, this event, or of the obstetrician named in Lausanne, France, where the birth allegedly took place. A story about discovering the lost city of Atlantis on the moon quoted a Russian scientist who had defected to France. Consultations with the Associated Press in Paris and with a prominent American expert on the Soviet space program turned up no one who knew of the person. The reporter then confronted the tabloids' editors with her results. The reaction? "If we had to check out every detail on those things, they'd never get in the paper," replied the managing editor of *Weekly World News,* Eddie Clontz. He said stories from freelancers in other countries about wacky events rarely get checked out the way stories in the U.S. (where lawsuits are much more common)

do. "They're stories the reader won't take action on one way or another. If they're true, that's OK. If not, it's not the end of the world."

Walker, L. G., Jr. "Alexis Carrel on Science and Pseudoscience." *Surgery, Gynecology & Obstetrics,* 168: 365-370, April 1989. An examination of the involvement of Alexis Carrel, recipient of the 1912 Nobel Prize in Medicine, with "miracles, magic, and telepathy." Carrel's penchant for the supernatural and paranormal provoked criticism from colleagues throughout his professional career. The author, a surgeon at Charlotte Memorial Hospital in North Carolina, uses Carrel's writings, letters, and the writings of friends and associates to assess this aspect of Carrel's life. Carrel's enthusiasms made him "easily deceived" and he sometimes made "extravagant claims" that were not verifiable. "Within him, there seemed to be a conflict between the scientist and the soul."

—*Kendrick Frazier, EDITOR*

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Follow-Up

The contributions in this section continue the discussion of issues arising from the Benveniste controversy, as reported worldwide last year and in a Special Report in our Winter 1989 issue.—EDITOR

When *Not* to Believe the Unbelievable

Wallace I. Sampson

"WHEN TO Believe the Unbelievable" read the headline of an editorial commentary in *Nature* (337:787, June 30, 1988). It explained that *Nature* had published an article whose conclusions seemed to support the principle of homeopathy, in that very dilute "solutions" of an antibody, so dilute that no molecule was likely to be left in them, seemed to have the same power that was present in optimal concentration. *Nature*'s editor, John Maddox, hoped that "vigilant members of the scientific community with a flair for picking holes in other people's work may be able to suggest further tests of the validity of the conclusions."

Nature selected a three-man panel, John Maddox, James Randi, and Walter W. Stewart, to investigate the homeopathy team's methods. The panel found sloppy controls, and fudging of data, and demonstrated that the experimenter could not replicate her results when the controls were tightened. A storm of letters reporting negative results of repeated experiments followed as well.

However, the question remained: By a critical reading of the original paper, could one show the claims to be invalid? Careful analysis of the study shows that, even if the experiments and the results were authentic, (1) they are unreproducible, thus of no use to homeopathic practice, and (2) the results suggest that homeopathy is more likely to worsen a patient's condition than to heal.

The first clue to nonreproducibility is in the third paragraph of the Benveniste report: ". . . Similar results were obtained *at one or the other part* of the high dilution scale in the participating laboratories (Toronto, preliminary results)." If the experiment were reproducible, the specific dilutions would have been consistent at all parts of the scale from one lab to another. This was the first clue that the peak activities reported were actually random.

Later in the paragraph is the statement: "The repetitive waves of anti-IgE-induced degranulation *could shift by one or two dilutions with every fresh sequential dilution of anti-IgE and depended on the blood sample.*" Each dilution in homeopathy is usually tenfold. The mean number of dilutions between each peak and the adjacent troughs in the paper's Figure 1 was 3.94 dilutions. If the peaks and troughs of activity could vary by one or two dilutions either way, the peak value of activity in one could shift toward a trough value of the next. Since this variation pertains to the same solution in sequential runs, predictability from any single solution is impossible. In other words, a homeopath might "prove" a specific dilution to be effective in a patient once, but could not be certain of the same effect at the time

of the next dose. The researchers should have tried to explain this inconsistency, but the problem was not recognized or was ignored.

The second problem is the conclusion that these results support the theory and practice of homeopathy. The authors state: "These results may be related to the recent double-blind clinical study of Reilly et al., which showed a significant reduction of symptoms in hay-fever patients treated with a high dilution (1×10^{60}) of grass pollen vs. placebo. . . ."

However, the results show that very dilute "solutions" (in this case, water only) seem to produce the same effect as solutions of optimal concentration of material. If the water still shows effects quantitatively the same as those of concentrated solutions, it should reproduce quantitatively the symptom of the illness. In this case, the water causes just as much histamine release from basophil granules as an optimal amount of an allergy-causing substance. Therefore, the treatment solution would cause just as much asthma or hayfever as that produced by maximum stimulation by the allergenic material. One must conclude that the results paradoxically support the view that if homeopathic treatment "works," it must make one worse or prolong the illness.

On a practical level, since homeopathy has never been "proved," analysis of the Benveniste paper supports the skeptical view that homeopathic solutions are in reality ineffective, that the results of these experiments have other explanations, such as contamination or fudging of data, and that any improvement in symptoms from homeopathic solutions is probably from placebo effect or suggestion. •

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The Benveniste Case: A Reappraisal

Elie A. Shneour

Most people who have followed the unfolding of the Benveniste case are royally surfeited with it, and for good reason. But the case raises a very troubling issue for the skeptics movement, and for the scientific community worldwide. It is disturbing because of the way the following question has been raised and, in the view of this writer, too glibly answered: Was there scientific impropriety or fraud involved?

The Maddox committee, which investigated Benveniste's laboratory in France, published its report in the prestigious scientific publication *Nature* (Maddox, Randi, and Stewart, 333:816, 1988). It scrupulously avoided suggesting that either scientific impropriety or fraud might have been involved in the generation of the data published in *Nature* by Benveniste and his associates (Davenas et al., 333:816, 1988). The report acknowledges its gratitude for the gracious openness with which Benveniste received and treated the committee during its stay at Clamart. Benveniste allowed the committee access to and the extensive photocopying of all the relevant material it desired. In fact, Benveniste offered to extend the disclosures to other systems

purporting to show the same kind of results. This cooperation extended beyond Benveniste to his associates, in particular Elizabeth Davenas, on whom the committee relied most heavily for information about the experimental procedures in the laboratory.

The committee was justifiably puzzled by attitudes and biases exhibited by Benveniste and his associates, which in many instances would be considered unorthodox, to say the least, by most experimental scientists. The experimental system, the data-gathering procedures, as well as the results reported by Benveniste are claimed to have been tested and confirmed by several independent laboratories in Canada, Italy, and Israel, respectively. Benveniste provided this writer with the correspondence from the Hebrew University of Jerusalem confirming the results obtained at Clamart.

For example, a letter dated July 31, 1988, from Boaz Robinzon of the Faculty of Agriculture, begins this way: "I want you to know that no matter what the *Nature* investigating committee has written, I am still confident that the phenomenon observed is a real and reproducible one and it is only a matter of time until we shall be proven right [*sic*]." In this connection, it should be added that Elizabeth Davenas from Benveniste's laboratory did spend the period of February 23 to March 2, 1988, in the Israeli laboratory. This writer has no independent reliable information on the confirmatory work reportedly performed at the other laboratories.

This writer, a native of France and fluent in the language, went to France last September to visit INSERM, the medical-research institute sponsoring Benveniste's work. He met with high officials of INSERM, some of them personal friends and scientific colleagues of long standing. As a result, he was informally invited to visit Benveniste at his laboratory at Clamart to form his own opinion of the controversy. This he did at some length, receiving the same open and gracious welcome and cooperation reported by the Maddox committee. He also met with several of Benveniste's associates, including Elizabeth Davenas and a number of technicians.

The goal of this intervention was to attempt an independent determination of the following: Did the Benveniste *Nature* report represent: (*a*) a significant but unappreciated discovery of a new phenomenon; (*b*) an artifact due to some as-yet-unidentified systematic error or errors, perhaps overlaid by naive experimental biases; (*c*) the result of scientific misconduct or fraud, consciously perpetrated by one or more of the investigators involved?

A significant but unappreciated new phenomenon? It was fairly easy to dismiss this possibility on the basis of the available evidence, and for the reason eloquently stated as the prime conclusion of the Maddox committee report: "The care with which the experiments have been carried out does not match the extraordinary character of the claims made in their interpretation." The committee should have added this obvious further conclusion: The data and their interpretation did not deserve publication. *Nature* Editor John Maddox, a member of the group, should have had the courage to admit his appalling error of judgment.

The results are an artifact? This appears to be the most likely possibility. From Benveniste's perspective, it should be highly questionable whether it is worth INSERM's human, time, and technological resources to try to justify his prior results by protracted additional work that might be more profitably applied elsewhere. But it might be interesting to try to identify the systematic error or errors that might have been responsible for the published results. A number of scientists, including this writer, have suggested experiments to Benveniste that could perhaps provide an explanation for his results. Scientific research often advances by unwitting mistakes made in the design and execution of experiments, which may uncover unexpected results.

But it takes a great scientist to separate the wheat from the chaff and recognize the significant factor involved in the generation of puzzling results.

Was there impropriety or fraud involved? This question lies, from the standpoint of the Maddox committee report, at the unstated core of the controversy—unstated, to be sure, but strongly implied by the composition of the committee and by its reported behavior during the Clamart visit. Among the latter is the high-jink of a sealed envelope containing the experimental codes attached to the ceiling of the laboratory. Such codes, for example, would contain information as to which numbered experimental sample contained what anti-IgE concentration. The researcher determines with a microscope how many, if any, basophils can be degranulated with a given blind sample, so that experimenter bias is effectively eliminated. Only after all the samples have been counted blind are the codes broken and each sample identified and correlated with the microscope reading.

In this context it is important to note that "reading" basophils in the microscope is far from a simple black-or-white determination. It is frequently difficult to tell an intact from a degranulated basophil, using a standard staining technique. Differences of opinions are possible in the making of such determinations. Nonetheless, there were fundamental and unexplainable discrepancies observed between blind and uncoded experimental readings that could be interpreted as involving scientific impropriety or fraud.

Although the Maddox committee report makes no statement suggesting fraud, two of its members have subsequently stated that scientific impropriety and fraud were, in fact, involved. This writer has heard both of them make this accusation without qualification. Although it is manifestly impossible at this point to unequivocally rule out scientific impropriety, trickery, or fraud, the circumstantial evidence alone, in the opinion of this writer, argues against such an accusation. This circumstantial evidence is briefly summarized as follows:

1. The openness, courtesy, and cooperation exhibited to all comers to Benveniste's laboratory and its staff. This writer is not aware of any attempt to withhold any document, any laboratory notebook, any interview, or even any humiliating requirement (i.e. the code taped to the ceiling). Any document, of whatever nature, could be freely photocopied and removed from the laboratory without any restriction. This is hardly the behavior to be expected from the perpetrators of fraud.

2. The obvious concern of Benveniste for recognition of his basic integrity that has compelled him and his staff to be repeatedly and mercilessly examined. This includes one item referred to in the Maddox report about a blinded experiment whose codes were sealed *in situ,* at the initiative of Benveniste, by a legal official in Clamart, Maitre Simart, but which were not available to the committee. This writer was able to obtain a copy of Simart's four-page sworn deposition of the detailed procedures he participated in on April 22, 1988, to maintain the integrity of the codes used in key experiments performed by Benveniste and his associates. This deposition seems to this writer to be an impeccable and one but too involved to be detailed here.

3. The unrecognized importance of the technician's role in a French laboratory. Most laboratory technicians in France, and especially in government-supported research laboratories, belong to a powerful trade union. This places them in a rather peculiar and, for all practical purposes, an invulnerable adversary position with respect to senior research investigators. Benveniste's laboratory has five such technicians, and this writer had the opportunity to interview two among them. Had there been any attempt at impropriety, trickery, or fraud, the technicians would have quickly

been able to detect it, and the news would have been in the press the very next day. These informal interviews, conducted in French, could elicit no suspicion of any possible malfeasance in Benveniste's laboratory.

4. Benveniste's public and private anguish and indignant responses. For example, he told this writer that on the first days of the committee's visit, while examining some experimental data, Walter Stewart is alleged to have bluntly and summarily concluded that "[thèse data] . . . are made up." In his several public statements, including those published in *Nature,* Benveniste challenges some of the committee's procedures, interpretations, and conclusions. The nature of some of the disagreements between Benveniste and the Maddox committee are fairly arcane and are not detailed here. They are not likely to be satisfactorily resolved without additional laboratory work, and in any event, they do not address the conclusions to be reached in this essay.

In a letter sent to *Nature* on September 20, 1988 (334:291), Benveniste asks: "A fraud implying five labs?" and complains of the circuslike atmosphere he claims was generated by the Maddox committee. He asks, for example, why [the] fraud-seeking pantomime of sticking the . . . code . . . to the ceiling . . . why not in their pocket since they know the code? Because they wanted to catch the villains tampering with the sacred paper. . . ." In another context Benveniste asks how it is possible to claim, as the Maddox committee did, that his published data is meaningless on the one hand and implies that it is fraudulent on the other. That it tries to have it both ways, continues Benveniste, demonstrates that the committee has not been able to come to any tangible conclusion regarding his *Nature* report.

Conclusions

What is one to make of this controversy? Actually a great deal. And it has nothing whatsoever to do with peer-judgment on the substance of Benveniste's *Nature* report. It has everything to do with the process by which this controversial work was evaluated and the conclusions reached. The fundamental fact is that the scientific community, which ought to be the final arbiter of published work, has not had the opportunity to respond to the *Nature* publication. Instead, "self-appointed keepers of the scientific conscience" (in Benveniste's words) with "no substantial scientific published record" took it upon themselves to pass judgment not only on the scientific worth of the work but also with what appears to have been a preconceived bias that Benveniste's data was fraudulently generated.

Benveniste (1988) states: " . . . Salem witchhunts or McCarthy-like prosecutions will kill science. Science flourishes only in freedom. . . . Our colleagues are overwhelmingly utmost decent people, not criminals. . . . Indeed, there is today a tendency in the United States to assume the worst when a controversy about the validity of published scientific data emerges. It is true that there has been a plethora of deplorable examples of scientific fraud exposed in the past few years. But it is important to emphasize that these have been extirpated, and mostly by peer action. What is new is the emergence of watchdogs of scientific purity, whose well-meaning but ferocious zealotry has already had a significant chilling impact on scientific work. When honest mistakes, differences of opinion, and often the fierce infighting for priority among investigators are too readily labeled as fraud, the whole scientific enterprise is placed in jeopardy.

Another example of this type of witchhunt is the recent and distressing experience of David Baltimore, a Nobel laureate, head of the Whitehead Institute for Biomedical

Research in Cambridge, Massachusetts, and the coauthor of a disputed report in the scientific journal *Cell.* In an extensive letter of record dated May 17, 1988, which Baltimore sent to his colleagues worldwide in the defense of his integrity, he wrote: "I believe that it is of critical importance that I set the record straight, not just to clear my own name and the names of other authors who have been compromised by this attack, but for another, more compelling reason: A small group of outsiders, in the name of redressing an imagined wrong, would use this once small, scientific dispute to catalyze the introduction of new laws and regulations that I believe would cripple American science."

To accuse a reputable scientist of dishonesty, trickery, impropriety, or fraud is equivalent to pronouncing a death penalty on his reputation and credibility. Although Baltimore and his colleagues in the *Cell* report have been vindicated by a National Institutes of Health investigating committee, which found errors but no evidence of fraud, the damage has been done. At least one congressional committee, perhaps two has been looking into the possible legislation of honesty in the research laboratory. The powerful committtee headed by Congressman John Dingell (D-Michigan) continues to hold star chamber hearings that exhibit no understanding of how science is done. If legislation results to create an organism for the sanitization of science, longterm damage to the scientific enterprise in this country is likely to be the unfortunate result.

Although one can expect insensitivity and misunderstanding of the scientific enterprise in the U.S. Congress, this should not be the case among the skeptics community. Our credibility and the respect in which our challenges of pseudoscience are held too precious to squander by the quick or careless application of one of the most powerful weapons in our arsenal: the application of the label of "fraud."

Our primary task is to educate, not to debunk. We must provide the citizen with alternative options to optimize his ability to think on his own. A fundamental principle of Anglo-Saxon jurisprudence is that a person is considered innocent until proved guilty by his peers. And that it is better for society to let a few guilty persons escape the net of justice than to convict a single innocent one. This is even more critical in the scientific endeavor, if we are to make the fruits of science work for the collective benefit of our civilization.

On the basis of the available evidence, this writer does not believe that Benveniste's laboratory has knowingly engaged in dishonest behavior. In his opinion, there is no compelling evidence to sustain such a serious and damaging charge. Under the circumstances, the wisest and most constructive course for us to follow is to help the scientific community invoke the powerful and ultimately always effective self-correcting peer mechanism. It should be allowed to operate unhindered by the inappropriate mechanisms that have so badly clouded the Benveniste controversy. •

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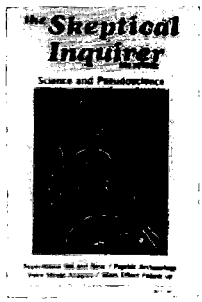

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'Remembering Water' and the Bell Curve

James Randi, in "The Case of Remembering Water" (*SI,* Winter 1989), asserts that "any data obtained by counting or measuring samples (people, cells, weights, stars, etc.) is subject to the rule that it must conform to a 'bell-shaped curve.' " Although the concept of a bell-shaped (Gaussian or normal) curve may be applicable to the remembering water controversy, it does not have the universality attributed to it by Randi.

To take an example of a sample he mentioned (counting people): If a large enough sample of the current population of the U.S. were obtained in order to determine the relative size of each ethnic group, including Caucasians, the concept of a Gaussian curve would be irrelevant. Many curves other than the Gaussian (normal) are possible. As Hayes puts it in his *Statistics for Psychologists* (1963): "The normal distribution is but one of a vast number of mathematical functions one might invent for a distribution; it is purely theoretical. . . . The normal distribution is not a fact of nature that one actually observes to be exactly true. . . . It happens to be only one of a number of theoretical distributions that have been studied and found useful as an idealized mathematical concept" (p. 218).

P. A. Lamal, Department of Psychology
University of North Carolina, Charlotte, N.C.

James Randi's comment that "self-deception and data flummery are not as rare in orthodox science" as one might suspect struck a responsive chord. One needs only to spend a semester or so teaching experimental methodology or consulting on problems in data analysis to reach a similar conclusion. If *SI* were to examine "regular" research as eagerly as it does the fringes, each issue might well be a massive tome.

Nonetheless, I have some problems with Randi's report as it appeared in print. It is not clear to me exactly how he determined, from the data, that Benveniste and his team had used "unorthodox methods" to obtain their data. It is apparent that Benveniste's data do not fit the "appropriate" Gaussian distribution shown in Randi's Figure 1, but nothing explains why the distribution is "appropriate." Perhaps more space could have been devoted to a careful explanation of the Central Limit Theorem, its implications, and its limitations; appropriate statistical values could also have been reported to bolster Randi's case.

However, as it stands, Randi's report relies upon the same appeal to authority that has so often been, and should be, grist for *SI*'s mill.

James M. Price, Oklahoma State Univ.
Stillwater, Okla.

While it is true that the Gaussian bell occurs often enough that it is also called the "normal distribution," its *universality* is no more than a common misconception. To take an obvious example, I would not expect the number of X-chromosomes in our cells to show a bell curve no matter how many cells you count; the same goes for a variety of quantized genetic traits, such as eye color or the amount of B-antigen in blood.

Another common distribution is the exponential, which has a peak at zero and falls off by a constant fact or for each unit of measure. (A graph of such a distribution resembles that of the changing radioactivity of a sample over time.) We might expect "the number of hard facts in an issue of the *National Enquirer*" to show such a distribution.

Strictly speaking, most natural measurements cannot match the Gaussian bell as a whole, because it has a "tail" extending to infinity in each direction: For any value, no matter how extreme, a truly Gaussian population shows a finite probability. Human adult height, for example, may be roughly Gaussian over the range of, say, 4 to 7 feet; but no human is 18 feet tall, much less negative 2 feet! (Similarly, because the *National Enquirer* is limited in size, the distribution mentioned above should show a sharp cutoff.)

The more glaring error is the assumption that there is only one true Gaussian bell curve. Wrong. The curve is determined by two things: its mean and its "standard deviation," a measure of variability. Stewart apparently graphed a generic curve with a standard deviation of 1.

Anton Sherwood
San Francisco, Calif.

The End of the Affair?

An Update: In July two committees reporting to the French national institute of health and medical research (INSERM) strongly criticized Jacques Benveniste's work on the "remembering water." In a statement to the press, the INSERM directorate said the two committees offered "a very favorable opinion" of the overall activities of Benveniste's laboratory, INSERM Unit 200, but were "extremely reserved regarding the studies of high dilutions." The statement criticized Benveniste for "an insufficiently critical analysis of the results he reported, the cavalier character of the interpretations he made of them, and the abusive use of his scientific authority *vis-à-vis* his informing of the public." The scientific committee's report said Benveniste's interpretations were "out of proportion with the facts" and appear as "a laboratory curiosity to which satisfactory explanations have not yet been given and whose import will remain limited." It recommended INSERM not continue funding high-dilution research.

However, Philippe Lazar, INSERM director-general, did not endorse that latter recommendation, suggesting to do so would interfere with the freedom accorded a laboratory director. In a four-page letter, Lazar asked Benveniste to look for sources of experimental error to explain his "unusual results" but also strongly criticized *Nature* for its handling of the matter, starting with its decision to publish an "insufficiently founded" paper, for the "oddness" of its visiting panel, and for the "offensive content" of its conclusions. He appealed to the media to "let Dr. Benveniste get on with his work." Benveniste, for his part, in a letter to *Le Monde,* said he *had* tried to find other explanations for his results and said the affair will "finish badly, in the utmost banality." He praised Lazar's letter: "Wisdom and courage have prevailed."

—*K.F.*

Forum

Fighting Occultists with Consumer Advocacy

Shawn Carlson and April Masche

SCIENTIFIC ARGUMENTS rarely dissuade people from frequenting occultists. This is probably because most people do not view science as the most reliable and successful method of gaining understanding about the universe. Many accept the erroneous notion that science is only one of many ways to understand the world—that there are countless alternative methods of finding the "truth." So what if astrology fails all of its scientific tests; so what if dowsing cannot be duplicated under conditions that preclude cheating; so what if spirits only materialize when observers are clutching hands in total darkness—all of these things lie in a hidden alcove, on a remote spiritual or intuitive plane that is tantalizingly inaccessible to scientific exploration. Believers are convinced that scientists have narrow-mindedly ignored an abundance of experience that proves the existence of psychic forces.

Therefore, objecting to paranormal claims on the basis of scientific principles does not generally sway people. There is, however, another tactic that may be more successful for addressing American audiences—*consumer advocacy.*

Americans wholeheartedly support consumer protection because they believe that they are entitled to quality checks on services that directly affect their physical, financial, or emotional health and have the right to know they are, in fact, getting the services they pay for.

When people learn that astrological counseling in the United States is a $100-million-a-year business, that it is totally unregulated, and that the vast majority of astrologers have absolutely no accredited training in counseling, they agree that there is a problem. When they realize that psychics, homeopathists, trance channelers, and other occultists have as much impact on their clients' lives as doctors and therapists, and that, unlike these professionals, the paranormalists cannot prove that they can provide the services that they are charging for, people accept that something must be done. When they are told of the marriages that have been canceled, the needed medical treatment that has been forgone—the lives that have been devastated by the advice of psychics and fringe-medicine apologists—people are outraged. Any consumer advocate *should* be outraged!

The consumer-advocacy approach to questioning paranormal practitioners is one that everyone can appreciate and one that no field of psychic pandering can survive. They all affect their clients' lives in significant ways, they are minimally regulated (if at all), there are no checks on the quality of their services, and above all, they cannot demonstrate that they can provide the service that the consumers are paying for.

We have found consumer advocacy to be a very effective approach for dissuading potential psi clients from seeking advice from occultists. Try it out.

Shawn Carlson is a physicist and April Masche is a technical consultant.

From Our Readers

Bigfoot prints

I read with interest and enjoyment the articles on Bigfoot by Dennett and by Freeland and Rowe (*SI,* Spring 1989). Dennett cited the *Newsweek* report of September 21, 1987, in which some researchers commented favorably on the new "dermal ridge" evidence. Those impressed found this evidence compelling because there was no way such a track could be faked, no hoaxer ingenious enough, etc. *Newsweek*'s experts, convinced by such lightweight stuff, apparently did not ask themselves the question "Is it more likely that Bigfoot has just recently evolved dermal ridges, which didn't show up in all the tracks previously reported, or that hoaxers have recently developed more sophisticated techniques?" Answering such a question might economize slender fieldwork resources.

Interestingly enough, in (I believe) the issue of *Newsweek* following its Bigfoot piece, a correspondent wrote to tell the editor how such a "dermal ridge" print might be faked. As I recall, the method involved making an elastic silicon mold of one's own foot and soaking it in kerosene to enlarge it. An early pro-Bigfoot argument touted the purported cast of a clubfooted specimen, which, according to convinced monster-hunters, no hoaxer would have been ingenious enough to conceive. I don't know about the hoaxers, but that would have been the *first* idea to occur to me.

Anyone care to go a-hoaxing, and see what breaks cover?

Samual T. Gill
Kansas City, Mo.

Whenever I read a Bigfoot story or hear one on the radio, I send the source a postcard saying: "Bigfoot was invented in 1930 by Rant Mullens of Lewis County, Washington." And I'll add other comments according to the situation.

Little did I think I'd have to send this message to *SI,* who printed the story "Bigfoot Jokester Reveals Punchline—Finally" in Fall 1982. You should always remind people that the source of the Bigfoot nonsense is old Rant Mullens, who may not be around anymore. My Dad was from Lewis County, and he and a friend learned about Rant's joke years ago, but they've both passed away. There may be no one left who has firsthand knowledge of the story.

Now, has Rant Mullens recanted? Have you found out he was prevaricating in 1982? If not, then please remind folks, whenever you do a story on Bigfoot, that it started as a joke.

Pat Miller
Aptos, Calif.

I enjoyed Freeland and Rowe's deductions in arriving at their conclusion that the Bigfoot plaster prints could not have been pore prints. But would it not have been easier to compare rather than deduce and theorize? They presumably had the original foot available complete with pores, didn't they? A comparison of the plaster "pores" with the actual pores in the foot would have been positive proof.

Stephen J. Hillenbrand
Knoxville, Tenn.

With reference to Michael Dennett's article about Bigfoot, two quotes form the basis for my comment/question: (1) "Hardin said he found conditions for the 'observation and readability of human sign to be excellent,' " and (2) "The tracks appeared and disappeared on the trail with no sign leading to or away from the area."

The case was called a hoax on this basis. There had to be human sign on either end unless Bigfoots fly helicopters or UFOs.

Kenneth J. Ewing
Los Alamos, N.M.

Michael Dennett responds:

In reply to Pat Miller: Rant Mullens passed away a couple of years ago without recanting any of his story as published in SI. *His testimony casts doubt on the authentic origins of the Bigfoot legend. Unfortunately, Mullens was not able to support his statements with significant objective data. As true skeptics, we must apply the same rigorous standards to unsupported statements that agree with our view as with accounts that don't.*

Ewing makes a good point in his letter. My article was not clear on the issue of other tracks. There was significant sign of human tracks near the alleged Sasquatch footprints. The tracker was unable to tell if the sign accompanying the Sasquatch tracks was only the result of the two Forest Service workers who found the tracks or was also evidence of a hoaxer.

Biology teachers' beliefs

The special report on "High School Biology Teachers and Pseudoscientific Belief" revealed some interesting sidelights on how data and the statistics derived from them can be misleading.

The remit of the surveyors appears to have been to explore the extent of pseudoscientific notions among high school teachers and especially to gauge the effects of creationist propaganda on such educators.

The majority of the statement/questions listed in the article, however, do not seem conducive to eliciting a response that would differentiate support for pseudoscience from mere religious sentiment. . . .

The one that comes nearest to hitting the mark is No. 4, "Dinosaurs and humans lived at the same time." This is the only question that asks the life-science teachers to discriminate on the basis of their knowledge for and against a well-known "scientific" tenet of creationism. The results are really very encouraging. After years of propaganda in which the Paluxy prints have featured prominently, a mere 6 percent of life-science teachers agree that one million years B.C. is an accurate view of a pre-Noachian world. If taken in conjunction with the other questions, it indicates that when science and religion conflict on an easily understood and well-publicized piece of data then less than a quarter of those who respond in the affirmative to "the reality of Satan" (No. 5, 29 percent) or "the reality of Adam and Eve" (No. 2, 34 percent) will also swallow "Dinosaurs and humans lived at the same time."

In their own publications, the creationists have recognized the key importance of dinosaurs in getting their message over to the general public. They realize that every child knows that dinosaurs died out long before humans emerged on the scene. This is why they hang on like grim death to the discredited Paluxy prints, churn out their own versions of dinosaur books, and even produce "Behemoth" dinosaur mugs.

The demise of the Paluxy human tracks the year before the survey was made may have been responsible for the very low score of 6 percent. However, even if that is the case, it can only be a source of encouragement to evolutionists that the fossil evidence counts higher than religious conviction among science teachers.

Michael E. Howgate
Dept. of Biology
University College London
London, U.K.

Critical thinking not enough

Al Seckel's article, "Rather Than Just Debunking, Encourage People to Think" (Spring 1989), points to the central value of *SI*. However, his remarks might have been applied to the "Special Report" on high school biology teachers and their beliefs in Bible literalism.

Rather than simply questioning teachers on what they believe, it would have been more revealing to find out *how* they arrived at those beliefs. Some 20 percent think that the Bible is a reliable source of scientific information, but what does the average biology teacher think constitutes the nature of scientific evidence? Why? Such questions would explore the problems about which Seckel writes and which skeptical inquirers might address as sources of muddled thinking. Seckel proposes critical thinking as a way to meet the challenge of ignorance and pseudoscience, and there is a great deal of support for this view.

California now requires of all graduates of its college/university system a critical thinking course, and other states are beginning to recognize the need for students to think critically. Yet critical thinking is not enough; one can proceed through rather exhaustive methodologies masquerading as critical thinking while still being confined within ideological fences. The medieval scholastics demonstrated a penchant for "directed critical thinking" in their excellent treatises on the logics of that period. Lacking in school curricula is not just critical thinking but philosophy. *SI*'s editorial policies generally seem to recognize this, and the composition of the "Fellows of the Committee" also shows that science's critical methodologies and philosophy are inexorably entwined.

Jeremy Horne
Bisbee, Ariz.

Thinking and speaking

One of the more significant among many significant articles in the SKEPTICAL INQUIRER in years is Al Seckel's "Rather Than Just Debunking, Encourage People to Think."

Here is an idea after reading that article that could be important. As a member of a service club, I know it thirsts for interesting speakers. I deliver short talks on many subjects and plan to work on one using Al Seckel's approach.

Service club luncheon and supper speakers are usually limited to 20 to 25 minutes, with a few minutes for questions. Why not ask a few of your most fluent authors to write such a speech, and then publish a few and encourage your readers to offer them to service clubs?

George D. Whitney, D.V.M.
Orange, Conn.

Uplifting explanation

In light of the large amounts of energy required to attain levitation, according to Warner Clements's calculations (*SI*, Spring 1989), and the similar amount of energy reunited with its sources (the levitator, presumably) upon de-levitation, I propose that we have found a possible explanation for the phenomenon of spontaneous combustion of human beings. Now if only there were some way of correlating occurrences of said combustion and levitation. . . .

James Unterburger
San Francisco, Calif.

End of invention

Referring to Samuel Sass' article, "A Patently False Patent Myth" (Spring 1989), the earliest known prediction that, since everything had been invented, technology was coming to a halt was not made by a U.S. commissioner of patents but by Sextus Julius Frontinus. Frontinus was an eminent Roman writer, engineer, soldier, and bureaucrat of the late first century. Of his writings *Strategemata* (*Stratagems*) and *De Aquis Urbis Romae* (*On the Aqueducts of Rome*) have survived complete; others exist only in fragments.

Book III of *Stratagems* is devoted to siege work. The author begins: "Laying aside also all considerations of works and engines of war, the invention of which has long since reached its limit, and for the improvement of which I see no further hope in the applied arts, I shall recognize the following types of stratagems connected with siege operations"; then follows a list of topics: surprise attacks, and so on.

Frontinus was not stupid; he lived when military technology was relatively static and so remained for several centuries. The pace of military invention picked up only with the arrival in Europe of Chinese military inventions, notably the stirrup, brought by the Avars in the sixth century; the counterweight catapult or trabuchet, in the twelfth century; and the gun, in the fourteenth.

L. Sprague de Camp
Villanova, Pa.

Orgone lives

With further reference to "The Orgone Obsession," by Martin Gardner (Fall 1988), and W. H. Watkins's letter on the subject (Spring 1989), "orgonomy" certainly has risen from the grave. In April 1989 I received an invitation from the Orgone Biophysical Research Laboratory, Inc. For a mere $190 I could attend a weekend workshop on "Dr. Wilhelm Reich's Discovery of the Life Energy." (If I were a full-time student, the price would be only $90.) The workshops were to be conducted by James DeMeo, Ph.D., in five different locations, from Cambridge, Massachusetts, to Seattle, Washington. In these workshops I would have a chance to learn many things, ranging from the function of the orgasm to the origins of warfare and the discovery of an energy in space.

I also was given the opportunity (for only $40) to subscribe to *Pulse of the Planet,* the quarterly research report of the Orgone Biophysical Research Laboratory. The editor of this quarterly is the same James DeMeo who gives the workshops. In vol. 1, no. 1, DeMeo presents "Response to Martin Gardner's Recent Attack on Reich and Orgone Research in the Skeptical Inquirer." Perhaps Gardner could persuade Dr. Matrix to attend one of the workshops and report.

George Gibson
Upper Montclair, N.J.

Science and subjective reality

I realize that the views of Maureen O'Hara (*SI,* Spring 1989: 226-227) are only a summary of her talk at the Chicago CSICOP conference. Still, it is hard to see her point. Does anyone who wants to know want a priest to interpret reality?

O'Hara may believe that we must accept that we live in a world of multiple realities, but I do not see why. I suspect the New Age is just another example of the flight from acceptance of the reality we are stuck with. In this reality, we all use science without exception where we want to be sure. Airplanes are not designed on spiritual principles.

What will the New Age and "modern awareness" be called 500 years from now?

R. J. McCurdy
Upper Darby, Pa.

If Lys Ann Shore's report on the CSICOP Chicago conference, "New Light on the New Age" (*SI,* Spring 1989), is accurate, then it would appear the purveyors of nonsense don't all fall within the New Age camp. Certainly, Professor O'Hara's opening thesis, that the pre-Enlightenment church can serve as a metaphor for the modern scientific establishment, is as silly as any New Age notion. Her peculiar reading of history notwithstanding, scientists are not priests and do not draw their power or influence from mystical sources. Scientists and science are respected and valued because their "story" of reality works. Airplanes fly; magic carpets don't. Penicillin cures syphillis; prayers, incense, rattles, medicine dances, holy water, and saintly relics don't.

Responsible scientists, especially physicists, don't have pretensions of infallibility—as O'Hara claims they do—and no responsible scientist or group of scientists has any desire to persecute those with whom they disagree. Anyone of moderate intelligence who considers the incredible advancement of science in the past one hundred years knows such an allegation to be patently false. Of all human establishments, the scientific one has been the most eager to discard theories and beliefs that have been made obsolete by advances in knowledge. Surely this would not be the case if scientists pretended to be able to "read God's mind" directly, if physicists aped the pope and adopted the claim of infallibility, and if scientists were eager to persecute "heretics," as O'Hara states.

William J. Ryan, Jr.
Duluth, Ga.

(Dr. O'Hara elaborated on her views in her subsequent invited article in our Summer 1989 issue devoted to the New Age.—ED.)

On Jahn's response

A nonscientist and nonstatistician, I would like to offer two observations on Robert G. Jahn's letter of response in your Spring 1989 issue:

1. Jahn cites a large database derived from "many marginal, but quite replicable, contributions" leading to "the statistical likelihood of the results' occurring by chance as 2×10^{-4}." He argues persuasively for the high consistency of the results.

How then do we account for the wide variation of the results from individual operators? Jahn says that *one-third of them did not produce significant results.* If the probability of the results being chance is 2×10^{-4}, what is the probability that *one-third of the operators can only produce a chance outcome?*

2. Let's assume that Jahn's results stand up. Thus, results exceed chance on average 1 time in every 2,500 trials! My mind then wanders back to the supposed real-world phenomena (such as, in this case, psychokinesis) that spawned such exhaustive laboratory experimentation. What psychic, clairvoyant, psychokinetic, mystic, soothsayer, or layperson *would even notice such a rare event?* Our wacky fringe population claims vastly greater success rates than just 1 in 2,500. In no way do Jahn's results confirm such people's claims. Clearly, the phenomena these people report are not the phenomena Jahn has (presumably) confirmed in the laboratory.

By the way, as a pilot I'm also interested in learning the applicability of his work to *aerospace science,* Jahn's field of expertise.

Glenn A. Emigh
Signal Hill, Calif.

Donahue forum for hucksters

I am astonished that *SI* swallowed and regurgitated Tom Shales's garbage about Phil Donahue taking the high road and being superior to the other tabloid-television talkers (News and Comment, Spring 1989). Donahue has been television's undisputed champion promoter of medical and nutrition quackery. Only Merv Griffin has even come close.

Donahue has repeatedly given an unchallenged forum to promoters of megavitamins, Laetrile, phony food-allergy testing, and practically every dingbat diet in the book to come along, which he helps make best-sellers. In spite of complaints to Donahue and the FCC from nutrition experts, he has continued to give millions of dollars worth of air time to hucksters of worthless and dangerous pseudonutrition books.

Donahue almost never gives skeptics and critics any rebuttal time. His unfairness is so egregious that I have even asked the FCC to investigate. After all, Donahue's shows have been critical to the enormous success of some of the books they have promoted. I think Donahue has learned that sensationalism and magical thinking sell. Remember, talk shows are considered entertainment, not news, even when presenting so-called

experts on AIDS, cancer, and infant nutrition. Donahue has sunk to new lows of irresponsibility in tabloid television.

Kurt Butler
Haleiwa, Hawaii

ACS bias on Shroud?

Shortly after reading the recent SKEPTICAL INQUIRER article dealing with the Shroud of Turin (Spring 1989), I received my issue of *Chem Matters* (February 1989). My school subscribes to *Chem Matters* as a service to its science teachers.

I was quite surprised at the treatment given this controversy by a publication of the American Chemical Society (ACS). The article is followed by an equally disturbing one dealing with the uncertainties of carbon-14 dating. After having examined both articles and having re-read your article I now have doubts about the objectivity of the ACS regarding this controversy. I wonder how many science teachers will use these articles in their classes to perpetuate the "mystery" of the Shroud of Turin.

George Farago
Science Department
Waldwick High School
Waldwick, N.J.

Comic books

As a comic-book reader, I was interested to see the brief article on Spiderman (*SI,* Spring 1989). I don't read any Marvel titles anymore, for artistic reasons, but a tip of the hat is clearly due whoever came up with this storyline. The Marvel readership has such a large component of the young, the impressionable, and the enthusiastic that "Marvel zombie" has become a catchphrase; since it is exactly this sort of person who is likely to be targeted by aggressive charlatans, this is an excellent place for such demonstrations of their methods.

Another individual comic issue that might be of interest to your readership is the Concrete Color Special #1, by Paul Chadwick, published by Dark Horse Comics. Though less readily accessible than Spiderman, Concrete has racked up a heavy-duty reputation among serious readers and repays examination by anyone interested in the medium. This particular issue is concerned with the protagonist's investigation of supposed UFO phenomena and demonstrates the importance of the investigator's attitude toward the subject.

Peni R. Griffin
San Antonio, Texas

Crowley no Satanist

It is strange to see certain assertions and allegations last heard on the "PTL Club" echoed by an audiologist in the pages of the SKEPTICAL INQUIRER! I refer to the letter from Michael W. Walker (Spring 1989) in response to Tom McIver's "Backward Masking" (*SI,* Fall 1988).

The advice of Aleister Crowley to listen to phonograph records backward occurs in his book *Magick in Theory and Practice,* on page 417 of the Dover edition currently in print. For some reason, neither the PTL speakers nor Walker bother to make this citation. Perhaps the omission is due to the fact that reading Crowley's admonition in context is less than supportive of the equation Jimmy Page = Crowley devotee = Satanist = perpetrator of backward masking.

Walker also makes the bald assertion that "Doing things backward has long been associated with ceremonial magic." When? Where? By whom? Does he mean the folklore about witches saying the Lord's Prayer backward, or what? There's certainly nothing about it in such works as A. E. Waite's *The Book of Ceremonial Magic,* even though Waite took a rather dim view of the whole business, Crowley included.

In the section of *Magick* in question, an appendix, Crowley is prescribing exercises for the purpose of learning to think backward. The purpose of this rather bizarre practice is to enable the student to remember "previous incarna-

tions." The connection between this advice and backward-masked accolades to Satan seems, shall we say, strained.

The bit about phonograph records is one-half of one item in a list of six. The passage reads, "Let him constantly watch, if convenient, cinematograph films, and listen to phonograph records, reversed, and let him so accustom himself to these that they appear natural and appreciable as a whole." Where does he say anything about disguising or listening for Satanic messages? Nowhere but in the minds of those who wish to characterize the recording industry as an instrument of Satan.

David F. Godwin
Dallas, Texas

It is clear that Michael Walker's research did not include Aleister Crowley or ceremonial magic. If we glance past the petty label of "infamous occultist," we may examine the facts. Aleister Crowley was many things: world traveler, mountain climber, chess master, poet, prolific author, yoga adept, magician, explorer, psychologist, humanist, mystic, and philosopher. Crowley's life work centered on the exploration of human consciousness, combining Eastern and Western techniques with scientific methodology.

Walker asserts that Crowley advocated listening to phonograph records in reverse as early as 1929. Actually Crowley recommended it in 1911, but not for the implied reason. Crowley's recommendation had absolutely nothing to do with subliminal messages. The technique was part of a method of training the mind to think in reverse. This method included reading, writing, walking, talking, and viewing films backward. The aim of these practices was to reverse the memory as far back as possible to uncover deep insights about one's identity. Converting people to Satanism by embedding subliminal backward messages was never part of Crowley's agenda, simply because Crowley was not a Satanist! Crowley did not believe in Satan any more than he believed in the authority of the pope.

Charles J. Phelan
Chatsworth, Calif.

Although I agree with Michael Walker's position about the absurdity of the backward-masking controversy, I was disappointed to see he still seems to embrace the claim that rock musicians are purposely altering their lyrics to create intelligible backward messages. I was particularly bothered by his critique of Led Zeppelin's "Stairway to Heaven."

1. While it is true that singer Robert Plant sometimes slurs his pronunciations of words that begin with "th" by "nasalizing with tongue-tip in an initial /*d*/ position," it cannot be assumed that this is done for the sole purpose of creating a backward message. In fact, this speech peculiarity can be heard in Plant's normal speaking voice (heard during interviews) and is apparently just a characteristic of his English accent.

2. There may or may not be clues in the lyrics suggesting that there is something hidden in the song—e.g., "... 'Cause you know sometimes words have two meanings." Walker, however, incorrectly quotes the lyric "And if you listen *very* hard" (not "long and hard") even though both the official copyrighted sheet music as well as the album sleeve show the lyric to be "very hard." I don't know how an audiologist could make this kind of mistake because the phrase "very hard" comes through loud and clear on my copy of the album. I have to wonder if Walker even bothered to look at the lyric sheet.

It is not my intention to dispute Walker's claim that some groups may have tried backward masking. I would only caution those who try to find secret messages about the ubiquitous self-fulfilling prophecy: If you think you are going to find something, then you probably will.

Charles Clifton
Marietta, Ga.

Animal matters

"Say what you will about my wife, but don't you dare say *anything* about my poodle Fifi." This seems to be the attitude evoked when someone touches the sensitive nerve of a pet lover.

Bay Area Skeptics hosted a meeting at which a worker from the Gorilla Foundation presented the case for Koko's communication skills. That meeting (and surely individual research) and a subsequent article in the *San Jose Mercury* led Robert Sheaffer to write his note about animal-human communication in his "Psychic Vibrations" column.

In your Spring 1989 issue (Letters), Forrest Johnson took Sheaffer to task for asserting that: (1) "animals have *no* feelings similar to those of human beings . . . ," (2) "a gorilla could [not] feel a need for motherhood," and (3) sexual dysfunction should not exist among gorillas. Where Johnson got these ideas is a mystery, because Sheaffer's article certainly neither said nor intimated, even in his durable wit, any of these things. Sheaffer's piece dealt strictly with the question of the linguistic *qua* linguistic capabilities of gorillas.

John Hubbard, in another letter critical of Sheaffer, leaps chasms in a single bound: "Sheaffer's a priori analysis concludes that Patterson's signing is fraudulent because Koko and Michael have not produced offspring."

Finally, Elizabeth Thomas throws the open-mindedness gambit on the table, assuring us that "animal awareness and animal communication [are] two of the most promising areas of inquiry." Of all the animal research being conducted worldwide, I would lay odds (I'm not making an assertion!) that the amount of study in animal "awareness" and communication—presumably intra-species—is minuscule and unpromising.

I would venture another stake that the majority of skeptics have a very high regard for all of nature; the Gorilla Foundation has helped raise our consciousness of the plight of those and other magnificent animals whose existence teeters on the very brink. But, regarding the topic of Sheaffer's piece, there is at this date no credible evidence that nonhumans possess the cognitive abilities for the level of abstraction alleged by some at the Gorilla Foundation.

Kent Harker
San Jose, Calif.

Critical bibliography

During the past month, I've helped the North Texas Skeptics prepare a bibliography of materials critical of pseudoscience. It will be sent to all public and school libraries in the area. it is hoped that some librarians will try to balance their collections. This bibliography includes only books currently in print and, to make ordering easy, each book is followed by its International Standard Book Number (ISBN).

Any reader wishing a copy may write:

John Thomas, President
North Texas Skeptics
P.O. Box 22
Arlington, TX 76004-0022

As SKEPTICAL INQUIRER readers know, the library and bookstore shelves groan under the weight of a flood of pseudoscience books. The situation with books for young people, however, is even worse. In my search I found precious few books that present the skeptical point of view to the young.

Unfortunately, many books on library shelves present paranormal events as fact. Books for young people in this category seem to deal mostly with psychic phenomena and UFOs.

There is a serious need for children's books dealing with pseudoscience. As far as I can tell, the field is wide open.

James Rusk
Garland, Texas

Groundless social analysis

In "Skepticism and Television Do Not Mix" (*SI*, Spring 1989), Philip Haldeman enthusiastically reviews *Boxed In: The Culture of TV*, a book of essays by Mark Crippin Miller. Miller's central doctrine, as repeated and endorsed by Haldeman, is that the nature of television shows presented in the guise of popular entertainment, and even of news, is dictated by big business, with the express purpose of molding viewers' minds—not merely their buying patterns—into passive obedient agents of consumption. It is not

simply that programs are chosen that are expected to be popular and thus to incline the viewers toward the advertised products, but that their specifc contents are designed to turn the watchers into mechanical consumers of products in general, with no minds or attitudes of their own. Quoting Miller, the purpose and effect is "to exact universal assent, not through outright force, but by creating an environment that would make dissent impossible."

This quasi-Marxist view of our wretched consumerist society of zombie buyers and omnipotent big business is offered with no evidence that could be considered scientific in even a remote sense, as described in the review.

The outlook that probably underlies such pretentious and groundless social analysis is twofold: antipathy to a capitalist society in which activities are motivated by self-interest ("greed"); and a contempt for popular taste as it is reflected in television popularity combined with the sense that to state this forthrightly would be to proclaim oneself anti-democratic. The means of escape from this latter dilemma is to assert that popular taste is not such at all, but is imposed on the hapless public by its exploiters.

It is unfortunate that, as I have seen in other articles in *SI,* individuals who consider themselves to be devoted to reason and evidence in a physical realm may be prone to accept and support social pseudo-analysis that ignores all criteria of logic and empiricism under the impulse to maintain their chosen dogmas.

Amor Gosfield
Santa Barbara, Calif.

Elvis, Roy, and John

I read with interest Robert Sheaffer's "Psychic Vibrations" column in the Winter 1989 *SI* concerning the innumerable Elvis sightings, since I know Elvis is alive and living in the Roy Orbison Celebrity Retreat, located in the scenic villa of Sheepdip, Wyoming. This facility is dedicated to helping musicians tired of greatness achieve solitude while keeping in touch with their fan clubs.

Elvis usually spends a hard day rubbing shoulders with other retreat members; a few shots on the small-arms range with John Lennon and ultralight jaunts with Buddy Holly and Randy Rhoads (and occasionally Ritchie Valens and Ricky Nelson riding pickup). Then, after a hearty meal with Karen Carpenter and Mama Cass, he plays a few riffs with Jimi Hendrix and Janis Joplin before retiring to the room he shares with Jim Morrison and Sid Vicious. It's only on the days he gets bored with his idyllic life that he disappears to grab a Big Mac in nearby Sodomite (home of that renegade branch of the Church of SubGenius, the Coalition to Reunite Gondwanaland), and thus are the rumors formed.

(On a more serious note, when I made a similar suggestion in a recent issue of the *Dallas Times Herald,* I actually received phone calls from people wanting to know where Sheepdip was located in order to find Elvis and/or Sid Vicious. One woman told me of her efforts to locate Sheepdip through Wyoming Directory Assistance, and refused to believe me when I told her it didn't exist! To paraphrase Harlan Ellison, the two most common things in the universe are hydrogen and credulity.)

Paul T. Riddell
Carrollton, Texas

The letters column is a forum for views on matters raised in previous issues. Please try to keep letters to 300 words or less. They should be typed, preferably double-spaced. Due to the volume of letters, not all can be published. We reserve the right to edit for space and clarity. Address them to Letters to the Editor, SKEPTICAL INQUIRER, 3025 Palo Alto Dr. NE, Albuquerque, NM 87111.

Local, Regional, and National Organizations

The organizations listed below have aims similar to those of CSICOP and work in cooperation with CSICOP but are independent and autonomous. They are not affiliated with CSICOP, and representatives of these organizations cannot speak on behalf of CSICOP.

UNITED STATES

Alabama. Alabama Skeptics, Emory Kimbrough, 3550 Watermelon Road, Apt. 29A, Northport, AL 35476.

Arizona. Tucson Skeptical Society (TUSKS), James McGaha, Chairman, 2509 N. Campbell Ave., Suite #16, Tucson, AZ 85719.

Phoenix Skeptics, Michael Stackpole, Chairman, P.O. Box 62792, Phoenix, AZ 85082-2792.

California. Bay Area Skeptics, Rick Moen, Secretary, 4030 Moraga, San Francisco, CA 94122-3928.

East Bay Skeptics, James Miller, Secretary, P.O. Box 20989, Oakland, CA 94620.

Society for Rational Inquiry, Bob Lee, President, 1457 57th St., Sacramento, CA 95819.

Southern California Skeptics, Susan Shaw, Secretary, P.O. Box 7112, Burbank, CA 91505.

San Diego Coordinator, Ernie Ernissee, 5025 Mount Hay Drive, San Diego, CA 92117.

Colorado and Wyoming. Rocky Mountain Skeptics, Béla Scheiber, President, P.O. Box 7277, Boulder, CO 80306.

District of Columbia, Delaware, Maryland, and Virginia. National Capital Area Skeptics, c/o D. W. "Chip" Denman, 8006 Valley Street, Silver Spring, MD 20910.

Florida. Tampa Bay Skeptics, Gary Posner, 6219 Palma Blvd., #210, St. Petersburg, FL 33715.

Georgia. Georgia Skeptics, Keith Blanton, Convenor, 150 South Falcon Bluff, Alpharetta, GA 30201.

Illinois. Midwest Committee for Rational Inquiry, Michael Crowley, Chairman, P.O. Box 977, Oak Park, IL 60303.

Indiana. Indiana Skeptics, Robert Craig, Chairperson, 5401 Hedgerow Drive, Indianapolis, IN 46226.

Iowa. ISRAP, Co-chairman, Randy Brown, P.O. Box 792, Ames, IA 50010-0792.

Kentucky. Kentucky Assn. of Science Educators and Skeptics (KASES), Chairman, Prof. Robert A. Baker, 3495 Castleton Way North, Lexington, KY 40502.

Louisiana. Baton Rouge Proponents of Rational Inquiry and Scientific Methods (BR-PRISM), Henry Murry, Chairman, P.O. Box 15594, Baton Rouge, LA 70895.

Massachusetts. Skeptical Inquirers of New England, Laurence Moss, Chairman, c/o Ho & Moss, Attorneys, 72 Kneeland St., Boston, MA 02111.

Michigan. MSU Proponents of Rational Inquiry and the Scientific Method (PRISM), Dave Marks, 221 Agriculture Hall, Michigan State Univ., East Lansing, MI 48824.

Great Lakes Skeptics, Don Evans, Chairman, 6572 Helen, Garden City, MI 48135.

Minnesota. Minnesota Skeptics, Robert W. McCoy, 549 Turnpike Rd., Golden Valley, MN 55416.

St. Kloud ESP Teaching Investigation Committee (SKEPTIC), Jerry Mertens, Coordinator, Psychology Dept., St. Cloud State Univ., St. Cloud, MN 56301.

Missouri. Kansas City Committee for Skeptical Inquiry, Verle Muhrer, Chairman, 2658 East 7th, Kansas City, MO 64124.

Gateway Skeptics, Chairperson, Steve Best, 6943 Amherst Ave., University City, MO 63130.

New Mexico. Rio Grande Skeptics, Mike Plaster, 1712 McRae St., Las Cruces, NM 88001.

New York. Finger Lakes Association for Critical Thought, Ken McCarthy, 107 Williams St., Groton, NY 13073.

New York Area Skeptics (NYASk), Joel Serebin, Chairman, 160 West 96 St., Apt. 11M, New York, NY 10025-6434.

Western New York Skeptics, Tim Madigan, Chairman, 3159 Bailey Ave., Buffalo, NY 14215.

North Carolina. Piedmont Skeptics, Chairperson, Mike Marshall; Meeting Organizer, Dave Olson, 2026 Lynwood Dr., Greensboro, NC 27406

Ohio. South Shore Skeptics, Page Stephens, Box 5083, Cleveland, OH 44101

Pennsylvania. Paranormal Investigating Committee of Pittsburgh (PICP), Richard Busch, Chairman, 5841 Morrowfield Ave., #302, Pittsburgh, PA 15217.

Delaware Valley Skeptics, Brian Siano, Secretary, Apt. 1-F, 4406 Walnut St., Philadelphia, PA 19104.

South Carolina. South Carolina Committee to Investigate Paranormal Claims, John Safko, 3010 Amherst Ave., Columbia, SC 29205.

Tennessee. Tennessee Valley Skeptics, Daniel O'Ryan, Secretary, P.O. Box 50291, Knoxville, TN 37950.

Texas. Houston Association for Scientific Thinking (HAST), Darrell Kachilla, P.O. Box 541314, Houston, TX 77254.

North Texas Skeptics, Mark Meyer, Secretary and Treasurer, P.O. Box 22, Arlington, TX 76004-0022.

(continued on next page)

Local, Regional, and National Organizations (Cont'd)

Texas, continued.

West Texas Society to Advance Rational Thought, Co-Chairmen: George Robertson, 516 N Loop 250 W #801, Midland TX 79705; Don Naylor, 404 N. Washington, Odessa, TX 79761.

Washington. Northwest Skeptics, Philip Haldeman, Chairman, T.L.P.O. Box 8234, Kirkland, WA 98034.

West Virginia. Committee for Research, Education, and Science Over Nonsense (REASON), Dr. Donald Chesik, Chairperson, Dept. of Psychology, Marshall University, Huntington, WV 25701.

Wisconsin. Wisconsin Committee for Rational Inquiry, Mary Beth Emmericks, Convenor, 8465 N. 57th St., Brown Deer, WI 53225.

AUSTRALIA. National: Australian Skeptics, Barry Williams, Chairman, P.O. Box 575, Manly, N.S.W. 2095.

Regional: Australian Capital Territory, P.O. Box 555, Civic Square, 2608.

New South Wales, Newcastle Skeptics. Chairperson, Prof. Colin Keay, Physics Dept., Newcastle University 2308.

Queensland, 18 Noreen Street, Chapel Hill, Queensland, 4069.

South Australia, P.O. Box 91, Magill, S.A., 5072.

Victoria, P.O. Box 1555P, Melbourne, Vic., 3001.

West Australia, 25 Headingly Road, Kalamunda, W.A., 6076.

BELGIUM. Committee Para, J. Dommanget, Chairman, Observatoire Royal de Belgique, Avenue Circulaire 3, B-1180 Brussels.

CANADA. National: James E. Alcock, Chairman, Glendon College, York Univ., 2275 Bayview Avenue, Toronto, Ontario.

Regional: Alberta. Alberta Skeptics, Elizabeth Anderson, 8 Beddington Rd., N.E., Calgary, Alb. T3K 1N6.

British Columbia Skeptics, Barry Beyerstein, Chairman, Box 86103, Main PO, North Vancouver, BC, V7L 4J5.

Manitoba Skeptics, Bill Henry, President, Box 92, St. Vital, Winnipeg, Man. R2M 4A5.

Ontario Skeptics, Henry Gordon, Chairman, P.O. Box 505, Station Z, Toronto, Ontario M5N 2Z6.

Quebec Skeptics: Raymond Charlebois, Secretary, C.P. 96, Ste-Elisabeth, Quebec, J0K 2J0.

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FINLAND. Skepsis, Matti Virtanen, Secretary, Kuismakujo 1518, Helsinki 00720.

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The Committee for the Scientific Investigation of Claims of the Paranormal

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- Maintains a network of people interested in critically examining claims of the paranormal.
- Prepares bibliographies of published materials that carefully examine such claims.
- Encourages and commissions research by objective and impartial inquiry in areas where it is needed.
- Convenes conferences and meetings.
- Publishes articles, monographs, and books that examine claims of the paranormal.
- Does not reject claims on a priori grounds, antecedent to inquiry, but rather examines them objectively and carefully.

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